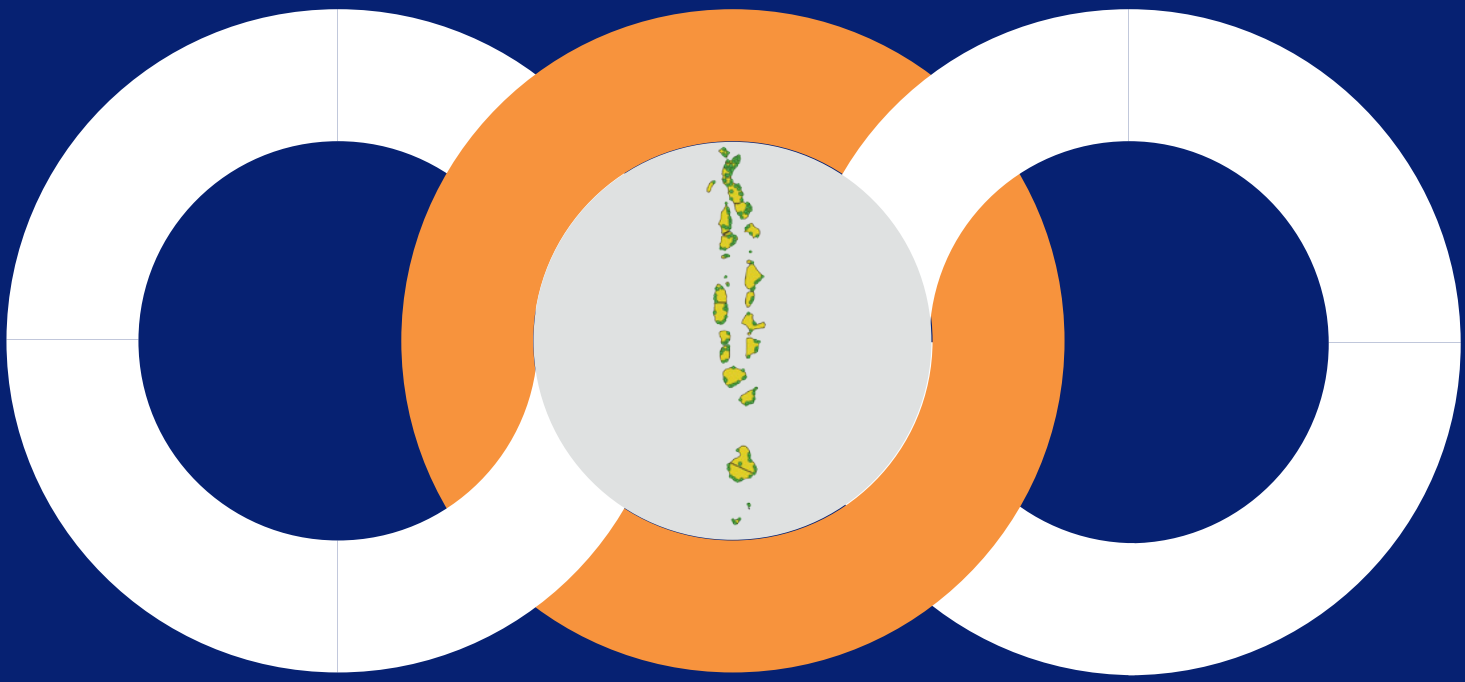
GPE KIX EAP HUB

KNOWLEDGE INNOVATION EXCHANGE



EQUITABLE ACCESS TO EDUCATION USING GEOSPATIAL DATA: A CASE STUDY OF THE MALDIVES

Dr. Ahmed Mohamed
Dr. Aminath Shafiya Adam
Moosa Adam
Ibrahim Asif Rasheed
Aishath Neena

IDRC · CRDI
International Development Research Centre
Centre de recherches pour le développement international
Canada

GPE Transforming Education

In partnership with
United Nations Educational, Scientific and Cultural Organization
International Institute for Educational Planning

Hosted by NORRAG and IHEID
NORRAG
Network for international policies and cooperation in education and training
Réseau sur les politiques et la coopération internationales en éducation et en formation
THE GRADUATE INSTITUTE GENEVA
INSTITUT DE HAUTES ETUDES INTERNATIONALES ET DU DÉVELOPPEMENT
GRADUATE INSTITUTE OF INTERNATIONAL AND DEVELOPMENT STUDIES

ABOUT NORRAG

NORRAG is a global membership-based network of international policies and cooperation in education and training. In 1977 the Research Review and Advisory Group (RRAG) was established, which then founded several regional RRAGs, one of which became NORRAG in 1986. NORRAG's core mandate and strength are to produce, disseminate and broker critical knowledge and to build capacity for and with academia, governments, NGOs, international organizations, foundations and the private sector who inform and shape education policies and practice, at national and international levels. By doing so, NORRAG contributes to creating the conditions for more participatory, evidence-informed decisions that improve equal access to and quality of education and training.

NORRAG is an associate programme of the Graduate Institute of International and Development Studies, Geneva. More information about NORRAG, including its scope of work and thematic areas, is available at www.norrag.org

@norrag norrag.network vimeo.com/norrag

ABOUT THE KIX EAP HUB

The Global Partnership for Education (GPE) Knowledge and Innovation Exchange (KIX) is a joint endeavour with the International Development Research Centre (IDRC) to connect expertise, innovation, and knowledge to help GPE partner countries build stronger education systems and accelerate progress toward SDG 4. There are globally four KIX hubs or Regional Learning Partners, overseen by IDRC. The hub functions as a regional forum within KIX. NORRAG (Network for International Policies and Cooperation in Education and Training) is the Regional Learning Partner for the KIX Europe Asia Pacific (EAP) hub.

The KIX EAP hub facilitates cross-country knowledge and innovation exchange and mobilisation, learning, synthesis, and collaboration among national education stakeholders in 21 GPE partner countries in the EAP region.. The hub also offers opportunities for peer learning and exchange by means of professional development and inter-country visits.

@KIXEAP gpekix.org/regional-hub/kix-eap norrag.org/kix-eap

ABOUT UNESCO INTERNATIONAL INSTITUTE FOR EDUCATIONAL PLANNING (IIEP)

Established in 1963 within UNESCO, the International Institute for Educational Planning (IIEP) develops and strengthens the capacities of educational planners and managers through professional development programmes, technical cooperation, policy research, and knowledge sharing. IIEP's vision is rooted in the understanding that education is a basic human right and thus, its mission consists of contributing to the expansion of quality education, to provide equitable and relevant learning opportunities to all.

iiep.unesco.org

ABOUT THE KIX EAP LEARNING CYCLES

The KIX EAP Learning Cycles are professional development courses offered to national education experts from 21 GPE partner countries in the Europe | Asia | Pacific (EAP) region. Teams of national experts analyse, contextualise, and produce new knowledge on policy analysis and innovations. These professional development courses allow participants to share experiences, exchange knowledge, and contribute to the strengthening of their national education systems. The learning cycles are also an opportunity for national experts to publish their studies and findings internationally, and disseminate them on diverse online platforms, with support from the KIX EAP hub.

ABOUT THE LEARNING CYCLE ON EQUITABLE ACCESS TO EDUCATION WITH GEOSPATIAL DATA

This case study is a result of the KIX EAP Learning Cycle "Equitable access to education with geospatial data". Organised by NORRAG and the UNESCO International Institute for Educational Planning (IIEP), this professional development course ran from 15 June to 16 July 2021. Across 5 weeks, this Learning Cycle enabled participants to apply basic mapping techniques on a geographic information system (QGIS), understand the geospatial dimension of educational planning and management, and challenge the different aspects of equitable access to education by harnessing the power of geospatial data in their daily work. 10 national teams from Afghanistan, Bangladesh, Bhutan, Cambodia, Kyrgyz Republic, Maldives, Moldova, Pakistan, Papua New Guinea, and Sudan took part in this Learning Cycle.

KIX EAP Learning Cycle Case Study, February 2022

The KIX EAP Hub is supported by

Photo by The Maldives Team in collaboration with the IIEP-UNESCO team

KIX EAP Hub / NORRAG
20, Rue Rothschild
P.O. Box 1672 1211 Geneva 1
Switzerland
norrag.kix@graduateinstitute.ch

This case study is a product of the KIX EAP Learning Cycle: Equitable Access to Education with Geospatial Data with external contributions. This work was supported by the Global Partnership for Education (GPE) Knowledge and Innovation Exchange (KIX), a joint endeavour with the International Development Research Centre (IDRC), Canada. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of the KIX EAP Hub, NORRAG, GPE, IDRC, its Board of Governors, or the governments they represent. The KIX EAP hub / NORRAG does not guarantee the accuracy of the data included in this work.

A BIOGRAPHICAL NOTE ON THE AUTHORS

Dr Ahmed Mohamed is an assistant professor in the Faculty of Education at The Maldives National University (MNU). He earned his doctorate degree from the Faculty of Education, University of Malaya, Malaysia. He was the founding president of the Principals Association of Maldives (PAM). He has published papers in Scopus and SSCI indexed journals and reviewed papers for several reputed international journals. He was awarded 'best paper' and 'best presenter' in various international conferences.

Dr Aminath Shafiya Adam completed her doctorate degree at The University of Waikato, New Zealand, in 2015. She is an assistant professor at The Maldives National University. Her role involves teaching, supervising postgraduate students and managing research projects. Some of her current research work involves teaching as a career, remote teaching and student engagement in online learning. She is also actively involved in writing for publications both in international and local peer-reviewed journals.

Aishath Neena has a Bachelor of Science (Hons) degree in Statistics from the Universiti Putra Malaysia (UPM), Malaysia. She is Project Coordinator for the Maldives Learning Advancement and Measurement Project (LAMP), funded by the Global Partnership for Education (GPE) for the Ministry of Education. Some of her proofreading and copyediting works include the Maldives Education Sector Analysis 2019, Education Sector Plan 2019–2023 (2019), the final evaluation report of the UNESCO Programme for Enhancement of Literacy in Afghanistan (ELA) III (2019), the Situation Assessment Report of the Disadvantaged and Underperforming Schools in the Maldives (late 2019), the Strategy and Action Plan to Support 55 Disadvantaged and Underperforming Schools in the Maldivian School System (early 2020), the Maldives Education Sector Response Plan (May 2020), and the Application to GPE COVID-19 Accelerated Funding for Maldives Education Response (June 2020). Previously, she worked as a statistical officer at the Ministry of Education, Maldives, and was involved in all educational statistical reporting at both national and international levels.

Ibrahim Asif Rasheed started his education career as a teacher and gradually climbed the steps up to management. After serving as a school principal, he joined the central Ministry of Education and now works as Director General of Policy Planning and Research Division of the Ministry. Under his leadership, Maldives introduced the Maldives Education Management Information System (MEMIS). He is the key official responsible for the education sector's planning and budgeting.

Moosa Adam is the current senior policy executive at the Ministry of Education (Maldives). Since starting his career as a teacher, Moosa has served the education sector in various capacities, including as a school principal and project coordinator for the Maldives Educational Management Information System (MEMIS). He is the key person behind developing the existing student reporting and monitoring system.

CONTENTS

Figures

LIST OF ACRONYMS AND ABBREVIATIONS

ADh	Alif Dhaalu
CHSE	Centre for Higher Secondary Education
ESA	Education Sector Analysis
ESP	Education Sector Plan
FS	Foundation Stage
HDI	Human Development Index
IIEP	International Institute for Education Planning
KS	Key Stages
KIX	Knowledge and Innovation Exchange
KIX EAP	KIX Europe, Asia, Pacific Hub
LKG	Lower Kindergarten
MDGs	Millennium Development Goals
MEMIS	Maldives Education Management Information System
MoE	Ministry of Education
MoT	Ministry of Tourism
NALO	National Assessment of Learning Outcomes
NBS	National Bureau of Statistics
NER	Net Enrolment Rate
SAP	Strategic Action Plan
SDGs	Sustainable Development Goals
SEN	Special Educational Need
SIDS	Small Island Developing States
TVET	Technical Vocational Education and Training
UKG	Upper Kindergarten
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WASH	Water, Sanitation and Hygiene Services
QGIS	Quantum Geographic Information System

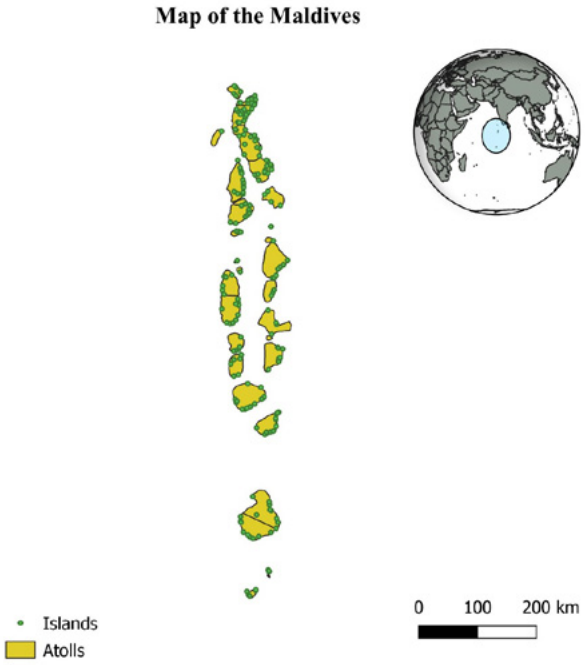
INTRODUCTION

This case study is produced by the Maldives team, who participated in the KIX EAP Learning Cycle 'Equitable Access to Education with Geospatial Data' proposed by IIEP-UNESCO. The team consisted of five members, all professionals working in the education and higher-education sectors of the Maldives. First and foremost, this case study provides a brief background of the Maldives' geographic location and its education system. Next, it presents five sections and provides an overview of each module, as outlined in the Learning Cycle. Each section includes important insights discussed during the Learning Cycle.

BACKGROUND OF THE MALDIVES

The Maldives is among the Small Island Developing States (SIDS)[1]. The Maldives consists of a chain of 1,196 coral islands, distributed vertically across a space of more than 800 kilometres from north to south in the South Asian Region (Figure 1) (Adam, 2015). While the Maldives is known as one of the most dispersed countries in terms of its geographic distribution, it is also the smallest Asian country in terms of both population and area (Adam, 2013). Out of 1,196 islands, only 196 are inhabited; 156 islands are adapted as tourist resorts (MoT, 2020), and the rest are uninhabited (Adam, 2015). The islands of the Maldives are surrounded by reefs and shallow lagoons. These are geographically divided into 26 atolls but are grouped into 20 atolls for administrative purposes. The Maldives is also considered one of the most vulnerable countries in terms of climate change because of the small sizes of its coral islands (Kelman & West, 2009; Ourbak & Magnan, 2018).

Figure 1: Map of the Maldives with location pointer

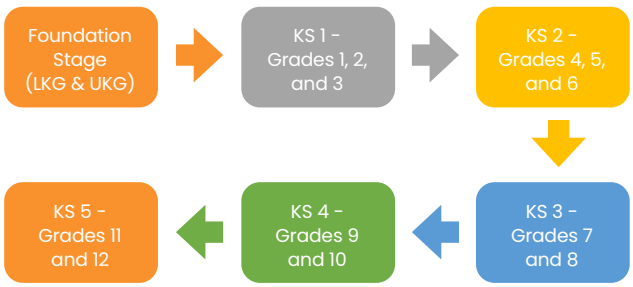


The current population of the Maldives is 549,704, based on the Worldometer elaboration of the latest United Nations data, and this population is unevenly distributed across the 196 islands. Many of the islands have a population below 1,000, with only four islands having over 5,000 residents (Athif & Pimenidis, 2009). The capital city of the Maldives is Malé. One third, or 37 percent, of the population lives in Malé. The following section presents a brief overview of the Maldives' education system.

Education system of the Maldives

The formal education system of the Maldives is divided into Foundation Stage (FS) and five Key Stages (KSs). FS includes Lower Kindergarten (LKG) and Upper Kindergarten (UKG), and the five Key Stages range from Grade 1 to Grade 12 (K–12). Students remain in the school system from age 4 to 18 years. The KSs correspond to the more commonly known levels, with grades as follows:

Figure 2: Education systems of the Maldives



There are three different types of schools in the Maldives: government, private and community schools. There are over 92,000 students enrolled in these schools. Interestingly, 87 percent of student enrolment belongs to government schools, while eight percent belongs to private schools. The remaining five percent belongs to community schools (MoE, 2019a). As reported by MoE (2019a) statistics, the highest enrolment in government schools is in KS 1 and KS 2, while the lowest enrolment is in KS 5, which constitutes higher-secondary education. A point to be noted is that female enrolment is reportedly lower than male enrolment in all

1 Small Island Developing States (SIDS) are a distinct group of 38 UN Member States and 20 Non-UN Members/Associate Members of United Nations regional commissions that face unique social, economic and environmental vulnerabilities.

KSs, except for KS 5. According to MoE (2019a), 80 percent of teachers are trained, while 20 percent are untrained. However, it is noteworthy to mention that a disproportionately high percentage of teachers in the atoll schools were untrained in 2019. This percentage includes 16.1 percent untrained teachers in the atolls, compared with only 3.2 percent in the Greater Malé Region (MoE, 2019a).

WHAT IS EQUITY IN THE MALDIVES

This section elaborates on important elements related to equity as a concept, any specific legislation that codifies actions related to equity and the education level examined in the present case study.

1. How is 'equity' used as a concept in your administration?

Equity and equality are essential elements clearly outlined in the Education Act of the Maldives. The Education Act of the Maldives (Act No. 24/2020) was published in the Government Gazette on 10 November 2020, and came into effect on 10 August 2021, with the beginning of the 2021/2022 academic year. As the President's Office outlines on its website, the Education Act 'provides a framework that can ensure equal rights and opportunities for children and adults to pursue education, as guaranteed by the Maldives' Constitution' (The President's Office of the Republic of Maldives, 2020, para. 2).

2. Are there pieces of legislation that codify actions related to equity? What pieces of legislation? What do they say?

The Education Act of the Maldives embraces 'the fundamental pillars of education: establishing the rights of students as well as teachers regarding education; the responsibilities of the state; and parents and tutors' (The President's Office of the Republic of Maldives, 2020, para. 2). The President's Office further elaborates that the main purpose of the Education Act is to 'ensure equal rights for children and adults alike, while protecting the rights of the tutors and promoting the core values of Islam within the national curriculum' (The President's Office of the Republic of Maldives, 2020, para. 3). To implement the mentioned Education Act, the government seeks to address issues related to equity of education in the Maldives. Notable among these issues is the implementation of the pre-primary integration policy, which is a major undertaking at scale. The integration policy addresses access, equity and quality issues because its purpose is to offer quality pre-primary education across all islands of the nation. In addition to the Education Act, the Juvenile Justice Act (Act Number 18/2019) and the Children's Rights Protection Act (Act Number 19/2019) embody equity of and in providing education to all school-age (ages 4 to 18) children.

How 'equity' is used as a concept in the educational administration: A core principle of the Sustainable Development Goal (SDG) 4 is that 'education is a fundamental human right and an enabling right' (UNESCO, 2016, p. 2). SDG 4 reiterates governments' commitments to uphold and respect the right to education, as codified in international law. Maldives fully supports SDG 4, Quality Education. While the government provides access to education from FS and up to lower-secondary schooling across the 196 inhabited islands, higher-secondary education is only available in 42 highly populated islands.

The Maldives is one of the developing countries in South Asia that has been successful in achieving its Millennium Development Goals (MDGs)[2] and subsequent SDGs (UNICEF & UNESCO, 2021). These goals include achieving gender parity in education. Based on education sector analysis (ESA) records, the Maldives has a gender parity index (GPI) of 0.96 percent for the pre-primary level (or FS), 0.93 percent for the primary level and 0.92 percent for the lower-secondary level. The country's GPI of 1.17 percent at the higher-secondary level indicates that girls participate at a higher rate than boys at this education stage. This is in line with the National Assessment of Learning Outcomes (NALO) 2017's statement that 'NALO findings of 2015, 2016 and 2017 suggest that Maldivian girls outperform in learning outcomes of Dhivehi, English and Mathematics in both grades 4 and 7 in primary schools across the Maldives' (Quality Assurance Department, 2018, p. 19). The primary and lower-secondary levels combined have a GPI of 0.93 percent (MoE, 2019a).

The issues of equity and the quality of provided education are receiving increasing attention from the Maldivian government. However, disparities have been identified in some areas. While analysing equity and education quality in the Maldives, Ali (2006) raised concerns regarding disparities of student achievement and the standard of education provided across

2 The Millennium Development Goals (MDGs) are eight goals with measurable targets and deadlines that the UN Member States have agreed to try to achieve by 2015. MDG Goal 2 in particular aims to achieve universal primary education by 2015.

the varied islands. The standards in the rural schools were lower than those in many urban schools and Malé city schools. As stated in the Strategic Action Plan (SAP) 2019–2023, the geographic features of the Maldives present several challenges to children's schooling (MoE, 2019b). These include the need for children from many small islands to travel to other bigger islands to seek secondary and higher education. At a policy level, providing quality education for all children is a challenge for the Maldives. The SAP 2019–2023 also identifies several systemic challenges, such as recruiting qualified principals, teachers, counsellors, health assistants and teachers of newly introduced subjects, as well as limited expertise in pre-school education programming, curricula, monitoring and evaluation. Further, limited resources mean many students do not have the opportunity to pursue their preferred stream of study towards their desired career. This is evidenced by the low percentage of higher-education students in the science fields, as well as the high demand for graduates from local industries.

More specifically, geographic vulnerabilities related to equity in education were identified in the ESA 2019–2023, as the spatial disparity between Malé and the outer islands contributes significantly to educational choices. The Human Development Index (HDI) for Malé is 0.734, compared with 0.627 for the outer islands. The observed HDI for the atolls is markedly low, largely due to the low average years of schooling compared to Malé (MoE, 2019a). This indicates that children who live in the capital city of Malé complete more years of schooling than do children from the outer islands. In addition, children typically begin their pre-school years at a younger age in Malé than do those on the outer islands. Finally, more students have access to higher secondary education in Malé than on the lesser-populated atolls.

The country's Education Sector Plan (ESP) (2019) states the following:

- Based on 2018 school statistics, the net enrolment rates (NERs) for females and males at the pre-primary level were 92.6% and 92.7%, respectively. The NER for primary schools was 95.9%, with 96.3% for girls and 95.5% for boys. The NER for lower-secondary schools was 90.5%, with 87.8% for girls and 92.9% for boys.

- The NER for higher-secondary schools was low at 44.5%. The enrolment consisted of 50.4% for girls and 38.9% for boys, indicating a stark disparity between male and female student enrolment above the age of 16. To ensure the continuity of education, further studies need to be carried out to identify, among others, whether the higher-secondary education programmes provided in the Maldives are attractive to or appropriate for male students.

- A few students leave their education to join the workforce after grade 10. The Ministry of Education has taken several steps to promote the completion of higher-secondary education and to provide an alternative pathway for all students to continue their education. It is important to review and realign these policies and monitor the progress of such programmes through the Maldives Education Management Information System (MEMIS). In a similar vein, although many female students join technical vocational education and training (TVET) programmes, their participation in work industries such as hospitality is lower than that of their male counterparts.

3. Identification of the educational level assessed in the case study

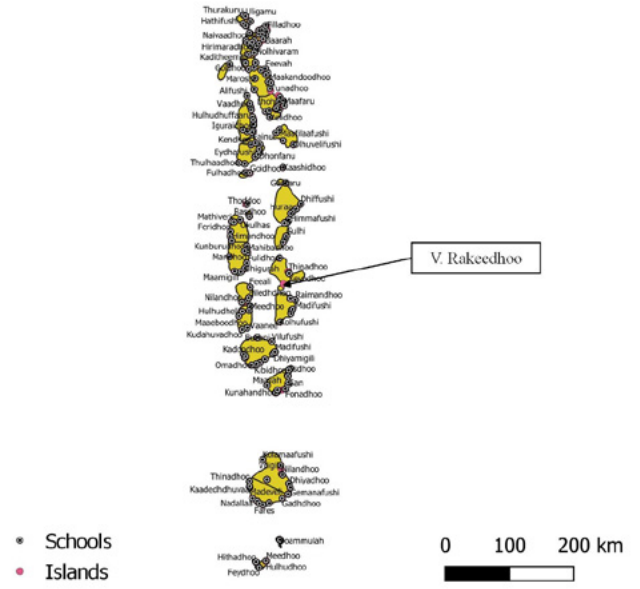
As mentioned in the country's ESP (2019), there is significant demand for higher-secondary education in the Maldives. A high percentage of students graduate from lower-secondary schools, and they have the right to access higher-secondary education. Thus, it is vital to map out the accessibility of lower-secondary and higher-secondary education in the Maldives. The key focus of this case study is to identify regions where the two levels of schooling are accessible to school-age children in the Maldives.

II

SCHOOL MAP PER EDUCATIONAL LEVEL

There are 360 schools across different regions of the Maldives: 212 government schools, 52 private schools and 96 community schools. Their locations and corresponding population densities are represented in Figure 3 below.

Figure 3: Map of school locations across the Maldives, combined with population density

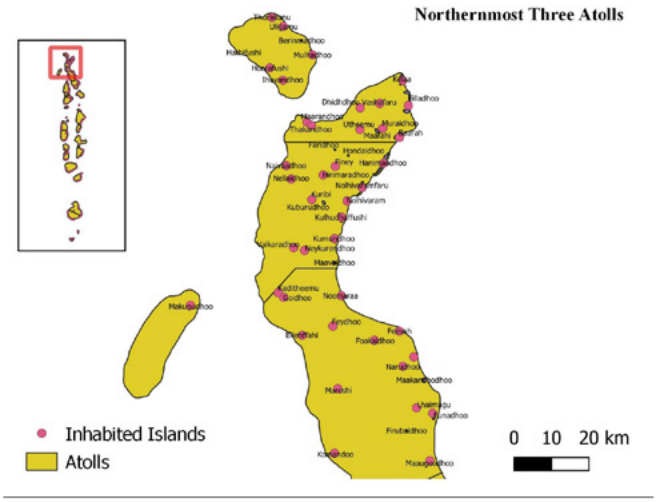


Note: Based on the available data at the time of drawing maps.

Figure 3 shows two administrative boundaries: i) atolls and ii) islands. The gold colour represents the administrative boundaries of atolls. Islands are scattered across the ocean within each of the atolls. Almost all inhabited islands have at least one school, except for a few islands, such as V. Rakeedhoo, as highlighted in Figure 3. Students from Rakeedhoo must move to other islands to attend school. Students from B. Fehendhoo, M. Naalaafushi and M. Veyvah live on their own islands, so they commute by sea to nearby islands for school on a daily basis.

Figure 4 illustrates how school locations are distributed within sub-administrative boundaries (i.e. atolls). The islands are scattered across the atolls, and not all these islands can offer higher-secondary classes. Students who wish to attend higher-secondary courses must either move to nearby islands or travel from one island to another on a daily basis.

Figure 4: Magnified view of the northernmost three atolls (Haa Alif, Haa Dhaalu, Shaviyani)



The following map outlines the distribution of higher-secondary schools and the issue of equitable access.

Figure 5: Distribution of lower and higher-secondary schools across the Maldives

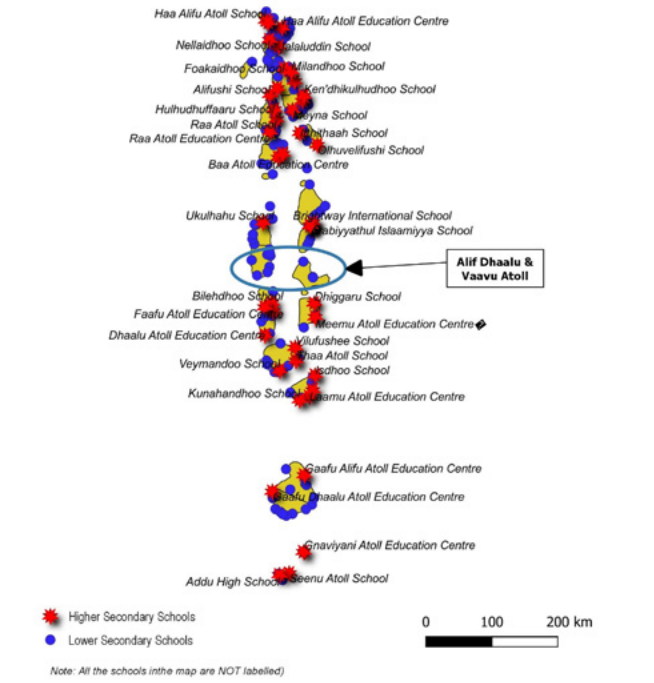
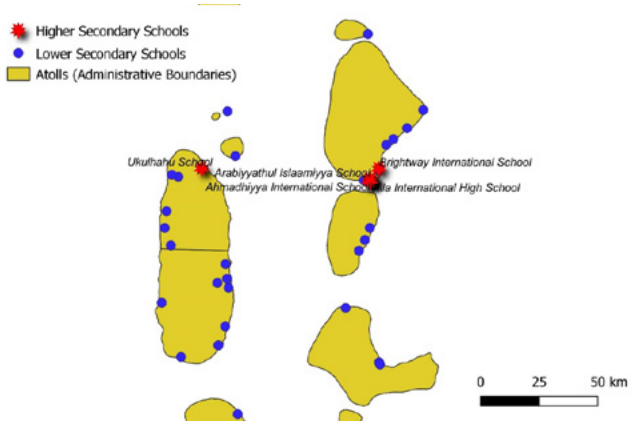


Figure 5 shows that not every island that provides lower-secondary education also provides higher-secondary opportunities. Students from these islands who complete their lower-secondary years face unequitable access to the higher-secondary level. However, Figure 5 also depicts that at least one higher-secondary school exists on almost every atoll. One atoll (Vaavu Atoll) has no higher-secondary school, and another (Alifu Dhaalu Atoll), despite having an established higher-secondary school, did not have any students enrolled in its higher-secondary programme in the 2020/2021 academic year. This zero-student enrolment could be due to disinterest in higher-secondary schooling, or that those qualified to enrol fell short of the minimum number of students required to form a Grade 11 class, according to the Policy on Introducing Higher Secondary Level Education in Government Schools (A-Level Policy, 28 January 2019). As such, lower-secondary graduates from these islands must migrate or travel daily to other islands if they wish to access higher education. Figure 6 illustrates the school locations in the North Central Region to highlight the existing accessibility gap between lower and higher-secondary education in the Maldives.

Figure 6 provides a closer look at the Alif Dhaalu (ADh) and Vaavu atolls. Notably, the ADh. Atoll Education Centre (ADh. AEC) is officially a K–12 school, but it does not currently provide higher-secondary courses. Students who complete Grade 10 at this school will not easily be able to access higher-secondary education. The nearest higher-secondary schools in the Alifu Alifu (AA. Ukulhahu School) and Meemu atolls (M. Atoll Education Centre (M. AEC)) cannot accommodate enough to resolve the equity and accessibility issues of higher-secondary admission for students in this region.

Figure 6: Location of lower and higher-secondary schools in the North Central Region

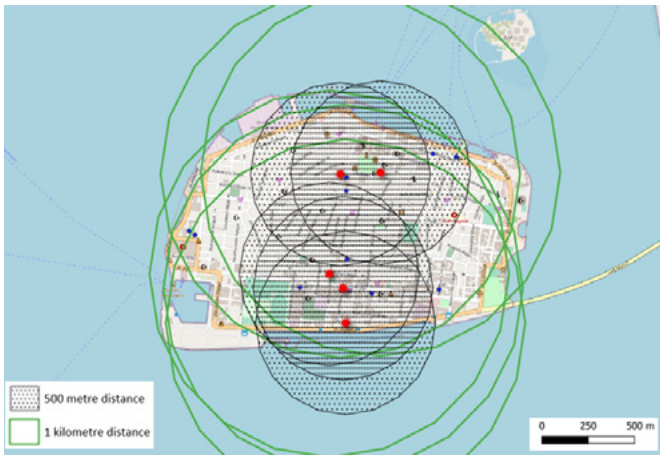


III

WHAT MIGHT AFFECT THE DEMAND FOR EDUCATION?

In terms of the demand for and supply of education, the present paper examined the locations of existing higher-secondary schools within the case study. Two methods were used to identify equitable access to higher-secondary education based on the existing schools. Figure 7 shows a catchment area of five schools in the Greater Malé Region that provide higher-secondary education. These five schools consist of two government schools (1 English medium and 1 Arabic medium school), one community school and two private schools.

Figure 7: Catchment area based on buffer method in Malé



The catchment area of the five higher secondary schools shown in Figure 7 were measured using the buffer method ('as the crow flies') based on 1 kilometre and 500-metre (0.5 km) distances. These five higher-secondary schools cover Malé for 1 km of the catchment area. However, three lower-secondary schools are not within the boundary of the 0.5 km catchment area of the higher-secondary schools. Hence, students who graduate from these lower-secondary schools, and who live beyond the 0.5 km catchments of the higher-secondary schools, must walk for longer distances than students who live within the catchment area.

Three islands comprise the Greater Malé Area: Malé, Hulhumalé and Villimalé. While Hulhumalé is connected to Malé by a bridge, Villimalé is not. This means that graduates of Grade 10 in Villimalé face the same challenge of accessibility to higher-secondary education, despite being within the Greater Malé Area. This may worsen if the trend of migration to the Greater Malé Area continues, as evidenced by multiple housing development projects in the area. According to the National Bureau of Statistics (NBS), education is the main reason for the migration of families to the Greater Malé Area (NBS, 2019). Figure 8 further depicts the three land areas of the Greater Malé Area and the issue of access to higher-secondary education.

Figure 8: Three islands in the Greater Malé Area and catchment areas based on buffer

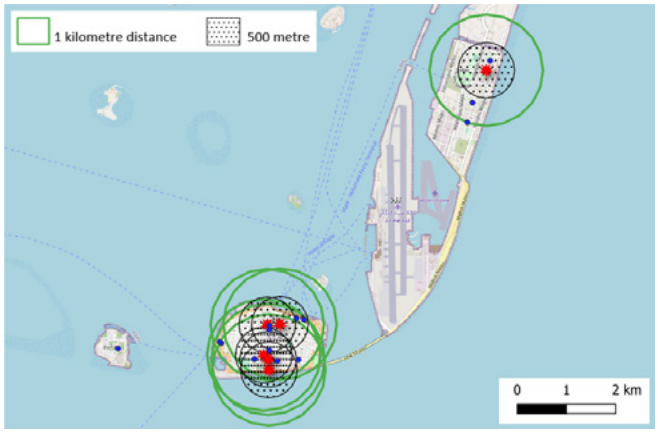
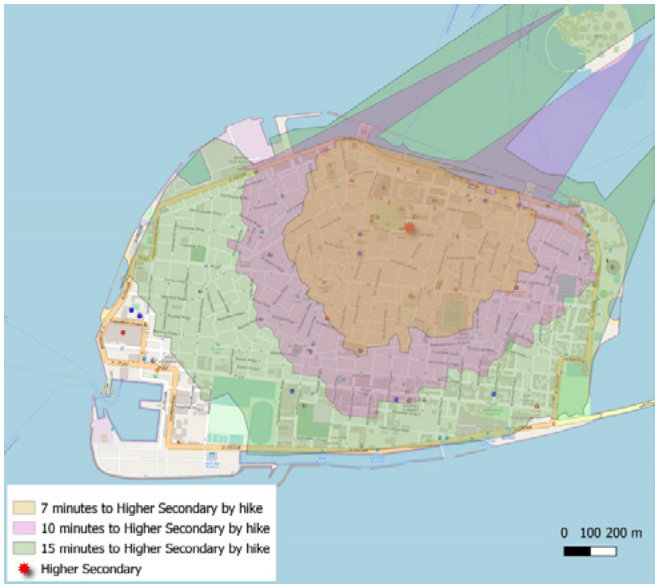


Figure 8 outlines the two other islands in the Greater Malé Area other than Malé. There is only one government higher-secondary school in the area that provides Advanced Levels (A-Levels) in the English language. Students who complete Grade 10 in Hulhumalé or Villimalé must travel to Malé to attend higher-secondary school. Furthermore, as there is no higher-secondary school on Villimalé, these students must commute to Malé by ferry crossing, which significantly increases their travel time and travel risk. Further, the higher-secondary school on Hulhumalé is a private school, so students in need of a free public education must also travel to Malé.

Figure 9 illustrates distances to the only accessible public higher-secondary school with the English medium (Centre for Higher Secondary Education (CHSE)) in the Greater Malé Area. This issue is illustrated with isochrones based on walking travel times.

Figure 9: Catchment area based on isochrones of travel time (on foot) to CHSE



As shown in Figure 9, most students living in Malé are within 15 minutes' walk of a school. Only a few households from the Maafannu Ward are not within the boundary of this catchment area. Roughly 50 percent of the households are beyond a seven-minute travel time. A high percentage of students need to walk more than 10 minutes to arrive at their school (CHSE). Figure 10 shows the same concept but in driving distance.

Figure 10: Catchment area based on isochrones of travel time to CHSE by car

As shown in Figure 10, less than half the territory in the first section of Hulhumalé is within the catchment area of 10 minutes' travel time by car, per the isochrones method. Extending the travel time to 20 minutes by car encompasses most of the area of the second section of Hulhumalé. However, travel times may vary depending on the maximum speed on the highway and traffic on the bridge between Male' and Hulhumalé.

Figure 11 demonstrates another issue of access to higher-secondary education based on isochrones, this time in the Addu Atoll region. There is one higher-secondary school in Addu Atoll, the southernmost atoll in the Maldives archipelago. The islands on the western side of the atoll, which include Gan, Feydhoo, Maradhoo, Maradhoo-Feydhoo and Hithadhoo, are connected by a causeway. Students living on these conjoined islands have access to only one higher-secondary school, Addu High School.

Figure 11: Catchment area based on different isochrones of travel time to Addu High School

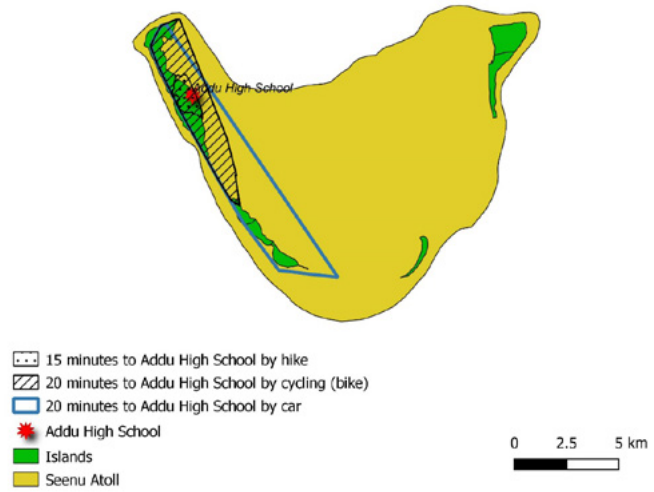


Figure 11 shows that students in the catchment area of Hithadhoo School (a lower-secondary school) cannot reach Addu High School within 15 minutes' walking time. Students from the far areas of Hithadhoo can reach the school by motorcycle within 20 minutes. Students from Maradhoo and Feydhoo need more time to reach the school by bicycle, or they need to travel by car for 20 minutes. These travel times may vary depending on the maximum speed limit set for the linking road.

These examples summarise the accessibility issue facing lower-secondary graduates who seek higher-secondary education in the Maldives. Even worse scenarios may have been revealed if the team had access to more comprehensive geographic data that could explain vulnerability issues related to the different regions where higher-secondary schools are located.

Thoughts and reflections on the supply of and demand for higher-secondary education in the Maldives

In the Maldives, schools are generally managed by the government at public expense. In the early years of the 2000s,

critical dynamics in the education system reflected efforts by the government to enhance the supply of schooling, both by increasing access and by improving the quality of the education provided. This focus on the supply side of the market originated in the increasingly wide acceptance of a national 'right' to education, which ultimately resulted in the virtually unanimous affirmation that states are responsible for ensuring that all young people have access to educational opportunities of at least a minimal duration and quality (World Conference on Education for All, 1990). Standards and expectations for the duration and quality of schooling in the Maldives have inexorably risen, accompanied by efforts to ensure equal access to educational opportunities for young people from previously excluded or marginalised groups, including girls, and special educational need (SEN) children.
The role of 'demand' in the public education system has traditionally been articulated almost entirely in terms of access to more, better and higher-status opportunities within the existing system, rather than for alternatives to the standardised, highly regulated opportunities provided by the government. Initially disadvantaged households and groups have sought to improve their positions through the education system, while prosperous and ambitious households have sought to maintain theirs. Where the 'demand' for schooling was weak or absent (e.g., in rural and some geographically isolated islands), the government has worked actively to persuade or coerce parents to send their children to school. One consequence of the government's efforts to encourage participation in the education system is the progress towards a balance in the distribution of educational opportunities, through steady moves towards common standards and comprehensive educational programmes for all students. As standards and expectations for minimal educational attainment have risen, the internal differences of the public education system has declined. The very success of the government's efforts to equalise opportunities has produced new demands on the education system, as households seek to ensure that their own children have privileged access to the best schools.

Despite the government's efforts to provide equal education opportunities for all children, significant challenges persist in terms of equity in accessing higher-secondary education. The earlier education system was divided into four levels: pre-school, primary, secondary and higher-secondary schools. Each of these levels were managed separately within the education system. Under the new curriculum, there are three levels: Foundation, KS1-4 and KS5 (in a separate school). It is important to note that some private schools offer KS1–5 levels. Previously, the supply and demand of lower-secondary and higher-secondary school enrolment was not much of an issue, as only a few schools offered lower-secondary classes in the Greater Malé Area. A remarkable change occurred when most schools (14) in the Greater Malé Area were offered a KS1–KS4 structure. While progress has been made in making lower-secondary education accessible in the Greater Malé Area, this shift has created a large pool of lower-secondary graduate students who want – but cannot access – higher education (see Figure 6). In addition, due to the rapid growth of migrants to the Greater Malé Area, the number of children graduating from lower-secondary schools and demanding a higher-secondary education in the Greater Malé Area has increased significantly (see Figures 6–11). The government has invested many efforts to plan and manage the equity of education with other alternatives, such as offering TVET programmes and other lower-level higher education opportunities. Examples include offering opportunities for advanced certificate level or diploma courses to those wanting to pursue a university preparatory education. This option has helped many students to bridge the gap between a lower-secondary and university education.

The included maps highlight that the demand for higher-secondary education is not proportionally catered to across all regions of the Maldives. Though lower-secondary education is accessible for all children across all regions, higher-secondary opportunities are limited in many areas. Even in the capital city, there is only one school, and its students are affected by travel times. This is in addition to the enrolment issue, by which only high academic achievers can receive access to the sole English-medium higher-secondary public school in the Greater Malé Area.

Ethical challenges that may rise from this information

The examples illustrated present no ethical issues, as this case study did not use any specific data regarding the students' places of residence when demonstrating the chosen mapping methods.

IV

HOW EQUITABLE IS THE SUPPLY OF EDUCATION?

The quantity of schooling that households consume depends on the price, which in turn depends on the supply of schools and the strength of household demand for schooling. Many households are willing to send their children to schools when the private cost of schooling is low, but that number diminishes as the cost rises. On the supply side, the government has worked steadily to reduce the cost of schooling and thereby make educational opportunities more accessible. In recent years, efforts have moved beyond the construction and staffing of schools towards the provision of a growing variety of distance and online alternatives to traditional schooling. The Maldivian government has also allocated resources to encourage student attendance at all levels of the educational system, ranging from school breakfast programmes in all government schools to massive subsidies for students in public schools. These policies aim to increase enrolment by reducing the private cost of schooling to shift the supply curve outward. On the demand side, leadership has sought to encourage households to send their children to school through policies. The government has invested substantial resources into 'social marketing' campaigns aimed at convincing households of the benefits of sending their children to school and keeping them there for long periods of time.

Per the political and economic arguments, there is a strong case for providing public schooling. The government is responsible not only for school construction but also for ensuring that citizens avail themselves of their educational opportunities. The number of young people attending school is increasing, as previously marginalised or excluded groups (e.g. children from isolated islands, girls, SEN children) are brought under the authority of the public school system.

There has also been a shift in educational policy discourse in the last decade. In response to the twin challenges of global economic integration and the emergence of an increasingly knowledge-based economy, policymakers have begun to give more explicit attention to 'demand' in the education system. To reduce the cost of public-school education, the supply of higher-secondary education has been very much regulated. Policies laid down by the educational authorities limit accessibility. Migration for education has been a tradition in the Maldives, but the locality of the migration very much influences other social and economic factors, such as parental employment, medical facilities and standard of living. Until early 2008, secondary education and higher-secondary education were very much limited to population centres; the only evidence seen to back this policy is to reduce the cost of education.

Both past and present policies that raise the national standards for supply largely depend on test scores and school populations. Though a high pass ratio compared to secondary completion rate has been achieved, the demand for grades 11 and 12 remains limited. The government is the major supplier of education in the Maldives, and it has standards for providing accessibility. The huge geographical dispersion of the population means migration for education, other than to the capital city, is very limited. The provision of different subjects in public higher-secondary schools is also regulated by policy, often restricted to some schools. Geospatial data, including economic, environmental and employability, may be mismatched, this causes demand for other alternatives to education and training to rise.

The emergence of new and heterogeneous educational demands may pose significant new challenges for national education systems. The articulation of 'demand' in the education system may have both private and corporate dimensions. The demand for schooling is assumed to be essentially homogeneous; parents complain about schools that fall short of their educational expectations. In recent years, however, new demands have emerged in the education system; namely, for schools and curricula that better reflect the goals and interests of regions or islands. It is not a simple matter to accommodate these demands within the traditional, government-centred education system. In the private dimension, 'demand' measures the variable aspirations and expectations of households and students with respect to educational access and quality. Under some circumstances, however, the educational demands of individual households may diverge from the goals of the government. Some households may prefer educational opportunities that fail to produce the external benefits that justify government provision, while others may wish to consume less education than the government deems as optimal or even acceptable.

The private choices that households make may even produce external costs for other households or for the larger education system. For example, decisions by some households to leave schools or islands have reduced the range and quality of educational opportunities available to the students who remain behind. Though the government's policy is to supply education at all levels on every inhabited island, the viability and cost of doing so depends on the population's ability to access secondary and higher-secondary education.

These new and diverse demands may conflict with the tutelary, nation-building purposes of the public education system, and with governmental economic objectives. Some parents choose international schools for their children to provide them with a 'better' education, on terms that are generally congruent with the government's educational objectives. Other parents, however, select these alternatives to educate their children in institutions that are better aligned with their own socio-economic status. The widespread conviction that schools are underperforming (and perhaps underperforming their previous levels too) also accounts for the lower demand on certain islands and for certain levels of education. Then again, the high demand for secondary and higher-secondary education, and the choice of parents to leave their home islands and migrate, add up to the decision of supply of these levels in a particular school. The national standard for the provision of schools is within 1 km radius for pre-primary and primary schools. Due to population density, however, this distance is higher in the Greater Malé Area and other populous islands (see Figure 7). The provision or supply of secondary schools and higher-secondary schools has not been set officially, but it is always supplied according to the demand in each region or island.

Selection of an element related to the supply of education

The existing education system presents a remarkable challenge in terms of providing higher-secondary education in a proportional manner, as demonstrated by the examples of varying or limited access to higher-secondary schools across the Maldives. It is important to note that students who complete their lower-secondary classes now have other alternatives to pursue an equivalent level of certification to a higher-secondary education. This, however, contradicts the Education Act, which clearly states that children under the age of 18 should have equal access to free schooling until they complete Grade 12. The loophole here is that access may be provided in whatever manner the educational authorities deem fit. Further, the alternatives for equivalent certification and all bridging courses towards a university education are not free of charge.

Are there any national standards?

According to the Education Act, the government is responsible for offering equal education opportunities to all children under 18 years of age. However, disparity exists in terms of the resources and facilities provided across the different regions of the Maldives. Although lower-secondary classes are offered across all the atolls, students have very limited resources for choosing their preferred stream of interest (e.g. Science, Arts, Business Studies). Given these limitations, many families from the atolls have no option but to migrate to the Greater Malé Area or send their children to nearby atolls if they are to receive a higher-secondary education. The existing standards set by the education authorities to provide higher-secondary education limit the supply across all atolls and islands. This supply is driven by demand, but only once it reaches the equilibrium or standards set by the government; the geographical disbursement of the population and islands ultimately limit this accessibility.

Distribution of lower-secondary school graduates in the Maldives

There is no accessible data for identifying the distribution of lower-secondary school graduates across all regions of the Maldives. The total number of students in lower-secondary education programmes is reportedly 5,270 males and 4,988 females, yet the total number of students in public higher-secondary schools is 1,020 males and 1,325 females (MoE, MEMIS Data, 2020). The existing data clearly identifies the insufficient supply/demand issue facing higher-secondary education, even in the most-served Greater Malé Area (see Figures 7 and 8). The data, however, does not provide sufficient information for mapping the total number of potential higher-secondary students across the different regions of the Maldives. Many other elements are necessary to identify the geographically vulnerable features related to different regions across all atolls and islands. Limited access to the data made mapping these elements impossible. Were the data available, the mapping could have highlighted additional gaps related to equity of access to higher-secondary education in the Maldives. Anecdotes of students' travels during difficult weather conditions, such as heavy rains and high tides, were frequently reported over the years of this study. Identifying such issues could assist strategic planning and refocus the choosing of appropriate locations for building new schools.

V

POLICY RESPONSES FOR MORE EQUITABLE ACCESS

This section outlines some thoughts related to the existing policies and how they impact equitable access to higher-secondary education in the Maldives.

Using geospatial data to map students' academic performance

The use of geospatial data would enable the MoE to identify disparities in terms of access to education and the allocation of resources to specific regions. Academic performance is a powerful indicator of quality education as it relates to many factors, such as teacher quality, school administration and the availability of teaching resources. Using geospatial data to map school performance, therefore, would be particularly useful to bring relevant interventions and allocate resources accordingly.

Review relevant policies according to the geospatial data

The current policies on introducing grades to an area depend on the number of students to enrol in the proposed grade. For example, if a school would like to introduce the higher-secondary grades (11 and 12), a minimum of 10 students must be enrolled in the grade/stream being introduced. This is according to A-Level policy. Currently, not much consideration is given to geospatial data when upholding such policies. As Figures 6 to 8 show, some atolls have multiple schools offering higher-secondary education, whereas other atolls have one or no schools offering such levels. The Raa Atoll has three higher-education schools, while the Vaavu Atoll has none. Geospatial analysis reveals this a huge disparity in terms of access to higher-secondary education between the atolls. Another distinct example is the Greater Malé Area. Roughly one third of the Maldives' student population is in the Greater Malé Area, but the area currently has only one government school (English medium) at that level. Moreover, some atolls near the Greater Malé Area do not have higher-secondary schools, which puts even more strain on the supply and demand system for education in the country.

How might geospatial data support the Ministry in targeting and prioritising these interventions or policies?

Geospatial data could support the MoE in targeting and prioritising interventions in many ways. One of the main policy bases for allocating resources is student enrolment. This case study revealed the need to focus on geospatial data while allocating resources and determining appropriate locations for schools. The allocation of safe water, sanitation and hygiene service (WASH) facilities could be mapped using geospatial data, for example. Many studies have been conducted to identify resource gaps between schools. One such study identified the most disadvantaged schools across various atolls. The MoE conducted a study in 2000 to identify the most underserved schools in the Maldives. The same study was replicated 20 years later. Mapping geospatial data with information from existing studies would be enormously helpful to confirm and visualise methods of resource allocation and seek solutions to other issues of school improvement.

Data Availability and Quality

Some limitations of this case study include issues of data availability and the quality of the available data. The analysis was conducted using available data received from trainers of this course and the Ministry of Education (MoE) of the Maldives. In terms of data quality, the land areas of some of the investigated islands exhibited misalignments with the available data and open street maps. Consequently, more time was required to confirm the correct data from respective government authorities. This was exacerbated by the fact that the last few weeks of the Learning Cycle and the concluding period of this case study coincided with an extended public holiday for the Maldives, due to the Hajj, Eid-Al-Adha and the Maldives' Independence Day celebrations.

Conclusions and Recommendations

This case study aimed to generate insights into higher-secondary education within the K–12 education system in the Maldives using geospatial data. This case study was not intended to produce an in-depth geospatial analysis of the

entire education system in the country. The data, analysis and visualisation revealed that areas of the country face equity issues related to access to higher-secondary education. These disparities originate from the existing policies on introducing higher-secondary education to government schools. Catchment areas based on buffers and isochrones reveal that higher-secondary schools in the Greater Malé Area, Addu Atoll and other islands have large land areas that require students to use public transportation.

The maps drawn for this case study were limited to availability and the quality of data received from the facilitators of the course and the MoE. Furthermore, the maps represent the first experiment in using geospatial data in a professional setting, which was a product of putting into practice the geospatial data visualisation conducted during the course.

The findings of this case study raise questions for future analyses of additional geospatial data to improve educational planning for relocating or building new higher-secondary schools in the Maldives. Future studies could investigate what and how to use geospatial data—such as geographic vulnerabilities, the health-related concerns of students, family demographics, the special needs of children, and economic and social issues of specific regions or islands—to ensure equity and equality when designing children's education in a more informed manner. Accessing such data and visualising or mapping via the Quantum Geographic Information System (QGIS) could inform strategic planning. The Ministry of Education might collect and publish more geospatial data as well. Future works could be extended to equity analyses that collaborate with relevant national institutions to consider the gender dimension or identify vulnerabilities to natural risks, such as sea level rise, heavy rains and natural hazards.

This case study concludes by recommending that the MoE of the Maldives establish a strong and sound database of student data records for the whole country. This case study also suggests designing a master plan with a clear framework for the accessibility of these educational data records and the ethical standards to be adhered to if any such data is to be used for different purposes, such as other research or educational plans.

REFERENCES

Adam, A. S. (2015). Understanding Teacher Educators' Pedagogical and Technological Cultural Habitus (PATCH): An Ethnographic Study in the Maldives (Thesis, Doctor of Philosophy (PhD)). University of Waikato, Hamilton, New Zealand. Retrieved from https://hdl.handle.net/10289/9552

Ali, A. (2006). *A study of the cluster school policy in the Maldives*. [Doctoral dissertation, Institute of Education, University of London]. UCL Discovery.

Athif, A., & Pimenidis, E. (2009). *E-crime threats on e-government: the case of Maldives* [Paper presentation]. The School of Computing and Technology 4th Annual Conference, University of East London, 16–25.

Kelman, I., & West, J. J. (2009). Climate change and small island developing states: a critical review. *Ecological and Environmental Anthropology*, *5*(1), 1–16.

Ministry of Education. (2019a). *School statistics 2019*. https://www.moe.gov.mv/assets/upload/School_Statistics_20191.pdf

Ministry of Education. (2019b). *Maldives education sector anlaysis*. https://support.moe.gov.mv/wp-content/uploads/2020/05/EDUCATION-SECTOR-ANALYSIS_ESA.pdf

Ministry of Tourism. (2020). *Resort list*. https:// www.tourism.gov.mv/facilities/resort/

National Bureau of Statistics. (2019). *Housing distribution and migration: household income and expenditure survey 2019*. http://statisticsmaldives.gov.mv/nbs/wpcontent/uploads/2021/03/HIES2019-PopulationDistributionMigration.pdf

Ourbak, T., & Magnan, A. K. (2018). The Paris Agreement and climate change negotiations: small islands, big players. *Regional Environmental Change*, *18*(8), 2201–2207.

Quality Assurance Department. (2018). *Quality Assurance Department Ministry of Education*. http://qad.gov.mv/img/uploads/oGw50voxr.pdf

The Education Act, Publ. L. No. 24/2020 (2020). https://www.gazette.gov.mv/gazette/download/5889

The President's Office of the Republic of Maldives. (2020). *President Ratifies Education Act*. The President's Office. https://presidency.gov.mv/Press/Article/23911

UNESCO Institute for Statistics. (2016). *Inter-Agency group on disaggregated education indicators (IAG-DEI): concept note*. http://uis.unesco.org/sites/default/files/documents/iag-eii-concept-notemarch-2016.pdf

UNICEF, & UNESCO. (2021). *Country study: Maldives* [Unpublished report].

KIX EAP Learning Cycle Case Study, February 2022

20, Rue Rothschild I P.O. Box 1672
1211 Geneva 1, Switzerland
+41 (0) 22 908 45 47
norrag.kix@graduatenstitute.ch


@KIXEAP


norrag.network


norrag.org/kix-eap


gpekix.org/regional-hub/kix-eap