

## **Survey sampling in the time of social distancing: experiences from a quantitative research in the wake of COVID-19 pandemic**

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**ABSTRACT** *This paper explores the practical difficulties of conducting an online quantitative survey across the Maldives during the COVID-19 pandemic response to study people's values in the midst of a crisis, and addresses crisis experience and perception, value orientation, personality traits, social cohesion, and trust in relevant authorities. This paper reports on the methodological component and not on the survey findings. A stratified systematic random sampling approach was used, with stratification on urban-rural clusters (cities and other islands), gender, and age of the population to recruit at least 400 from the urban and 600 participants from the rural communities. To overcome the practical difficulty of accessing households due to restrictive measures across the Maldives and lockdown status in the greater Male' area, the latest voters' registry was used to select every  $n$ th participant as the sample frame. Participants were recruited through phone calls, and survey instrument shared via social media, achieving a response rate of 87%. The practical difficulties with the sampling approach were different in urban-rural clusters, ranging from securing the phone numbers for prospective participants, nonresponse to phone calls, discrepancies in internet access, and the lack of control on whether the intended participant was in fact the person completing the survey. To overcome these challenges, a mix of probability and non-probability sampling was utilised ensuring not more than one participant was recruited from any household, while adhering to the stratification of gender and age. The statistical findings on the validity and reliability of the data show that the recruited sample is representative of the population. This outcome highlights the adaptability and applicability of established quantitative research methods to a geographically dispersed small island developing state, under nonconventional situations.*

**KEYWORDS** *sampling strategies, survey methods, COVID-19, online questionnaire, Google forms,*

National surveys are a challenging undertaking even under normal circumstances. It is interesting to observe how these challenges are amplified in an alternative setting where physical access to prospective participants is completely inaccessible.

Social distancing measures implemented in the wake of coronavirus disease (COVID-19) pandemic varies and can include ensuring at least 1.5 meters between people in social settings, prohibition of social group activities, closing of public outdoor spaces, and limiting the number of people who can enter or occupy physical spaces (Bruin et al., 2020). On top of this, governments imposed strict curfew-like measures to curb community spread of COVID-19. This paper reports on the methodological component of a cross-country national survey, that was carried out in May 2020 using mobile phone connections, to assess values of the residents of the Maldives in the midst of COVID-19 pandemic.

The Maldives reported the first COVID-19 cases during March 2020 with 13 infected people from a number of resort islands (Hussain et al., 2020), that were classified as imported cases. Swift precautionary measures were introduced by the Health Protection Agency (HPA) with the first ever state of public health emergency declared in the country on March 12, 2020 (MED, 2020). Consequently, all schools and non-essential government & public offices were closed to encourage and promote social distancing in order to prevent a community spread of the coronavirus. The first community case was confirmed in Male' city on April 15, 2020, resulting in the HPA enforcing a lockdown of the greater Male' area effective from the same day and movement restriction between islands across the country. The data collection reported in this paper was initiated during the sixth week of lockdown, in the last week of May 2020. At which point there were 1,106 confirmed cases of COVID-19 and 4 associated deaths (WHO, 2020) with 400 residential buildings under monitoring/quarantine (HPA, 2020).

The Values in Crisis (VIC) survey was initiated in Germany and the UK, with the onset of the pandemic in March 2020. At the time of writing this paper, Austria, Brazil, Japan, Kazakhstan, the Maldives, Poland, South Korea, and Sweden had been identified as contributors, with additional countries under consideration. The local research team from the Maldives joined this international research project as studies of values has never been systematically carried out in the Maldives and is believed to be an important area of investigation in the backdrop of the swift developmental and political changes occurring in the country. While a number of studies have focussed on specific socio-economic dimensions of the Maldivian society—for example, the rights side of life studies (Hosking, 2011) focusing on human rights, the study on women's life experiences (Fulu, 2006) that focussed on gender based violence, the study on social connectedness of the ageing population (Moosa, 2019)—aspects of values, beliefs and norms which drives the behaviour of the Maldivian society which forms the visual attributes and attitudes of the culture appears to be in need of further exploration.

Furthermore, the COVID-19 pandemic caused governments to enforce restrictive measures, that in otherwise normal circumstances can be seen as authoritarian and breaching on individual rights and freedom which can lead to disruptive outcomes. As reported by Huynh (2020) countries with higher 'uncertainty avoidance index' has a lower proportion of people breaching government implemented social distancing measures. Likewise, the VIC survey, among other things, studies social cohesion, solidarity within the community, and trust in public institutions, with an overarching purpose of analysing whether the coronavirus pandemic impacts moral values and social orientations, and if it does, how massive these changes are and in which direction it moves.

Accordingly, the VIC survey is designed as a panel study (using a representative sample) that surveys the same people throughout the different stages of the COVID-19 pandemic: in the midst of the pandemic (wave 1), shortly after the pandemic ceases (wave 2) and when things return to normal (wave 3). Consequently, enough respondents need to be recruited in wave one to be available in the two subsequent waves with the goal to have at least 600 respondents consenting to participate in wave 3 of the survey.

The objective of this paper is twofold. First, we explore experiences and challenges of stratified sampling and participant recruitment for the wave 1 of the VIC survey, in the time of movement restriction for COVID-19 containment. Second, through statistical analysis on the respondent demographics, we seek to determine the validity and reliability of the adopted alternative sampling methodology for this survey.

This paper is timely as it highlights how traditional survey recruitment strategies have been adapted under a strict lockdown situation that restricted physical access to participants. The findings will be significant for the wave 2 and wave 3 of the survey as well as highlight the overall reliability of the survey findings when it is ready to be released. This paper focusses on the methodological aspect of the VIC survey and does not report on the findings.

## **Literature Review**

### **Quantitative surveys**

The VIC survey is designed as a quantitative research using a fully standardized questionnaire with closed-ended questions. Surveys help to interpret the social world by understanding human experiences through the viewpoint of selected social 'actors' (Sarantakos, 2005). On the one hand, surveys with closed or 'forced-choice' questions, people will have no choice but to choose possibly a vague answer if the range of answers is insufficient or the questions have not been well developed. On the other hand, the advantages include ease of coding the responses, easy administration by the participant, and also motivating participants to respond as it will not take too much of an effort on their part (de Vaus, 2002). The limitations can be countered by a careful consideration of question terminology as well as extensive piloting.

The proliferation of online survey tools such as Qualtrics<sup>TM</sup> and Survey-Monkey<sup>TM</sup> simplifies the creation of surveys, and additional features such as data download as .xls or .csv file eliminates manual data entry (Elbeck, 2014). The advantages of using such tools with the combined strength of creating user-friendly intuitive questionnaires as well as built-in seamless statistical reporting, and the ease of questionnaire distribution makes online questionnaires an ideal option for researchers too (Perkins, 2011).

While the online questionnaire modality makes the survey distribution as well as survey completion easy, it does not necessarily ensure participation. Successful survey outcomes have relevance to the credibility of the results, and credibility is to a large extent linked to the response rate (Perkins, 2011). As reported by Nulty (2008), response rates to online surveys in fact are lower than for face-to-face surveys. According to Perkins (2011), response rate can be increased by offering incentives, increasing the number of contacts with participants, personalising invitations, and the trustworthiness of the survey sender.

Apart from these, questionnaires that are self-administered or that are not completed face-to-face, has the difficulty in ensuring the intended person fills in the questionnaire (de Vaus, 1995). With online questionnaires, there are mechanisms to send individual access links to individual email addresses, thereby having some control over who completes the survey, but this can erode confidentiality of participants if the survey is meant to be anonymous. Ensuring privacy and confidentiality of participants are central ethical issues in the use of research participants (Kumar, 2011). Equally important is assuring data integrity through appropriate sampling approaches.

### **Sampling**

While the quantitative survey questionnaire lacks the flexibility of immediate causative probing for clarity and context, responses from a large enough sample can be generalised to the population (Sarantakos, 2005; Tacq, 2011). Sampling theory is guided by two principles: the avoidance of bias in the selection of a sample, and the attainment of maximum precision for a given outlay of resource (Kumar, 2011).

In determining the sample size for a survey, key factors are the degree of accuracy required for the sample and the extent to which there is variation in the population in regard to the key characteristics of the study (de Vaus, 2002). This translates into the level of confidence in generalisations of findings and it is generally believed that the larger the sample size, the lower the sampling error and the greater the confidence level. However, as de Vaus (2002) further states, there are difficulties in determining an appropriate sample size as there are quite a few variables that needs to be considered such as cost, time and access to respondents.

Sampling for quantitative studies can be broadly random or non-random. In a random sampling each individual in the population has an equal probability of being selected while in a non-random sample, the process does not provide equal chances for each individual in the population (Gary, 1990). For population-based studies, random sampling methods improve the quality of the findings in terms of accuracy and avoidance of bias (Krishnaiah & Rao, 1988). However, given the context of the population being studied, different techniques are adopted in random sampling; simple random, systematic stratified, cluster and multi-cluster (Scheaffer et al., 2011). In systematic sampling every *n*th element from a sampling frame can be selected to reach the target sample size (Bryman, 2016). Simple random sampling is rarely used in large surveys due to time and cost of field work, while stratified or cluster random sampling are used when the populations are not homogenous or expect responses within one cluster to be different to the other cluster (Kitchenham, & Pfleeger, 2002).

Stratification in terms of subgroups is also important if there is sufficient reason to believe that the level of participation might differ from certain groups of the community. For instance, Riyaz (2019) reported it was difficult to recruit male participants in both rural and urban localities for survey in the Maldives. In the rural community the difficulty arises as many of them were not residing on the island as they work on remote resort islands or had temporarily relocated to Male'. In urban Male' the difficulty in recruiting male participants were observed to be due to the prospective participant's time constraints, or disinterest (Riyaz, 2009).

A non-probability version of stratified sampling is quota sampling, which is used when sampling frames are not available and/or there is limitation in time and budget but the study requires certain population characteristics to be represented in the sample (de Vaus, 1995). Stratified sampling and quota sampling are quite similar in that the sample population is grouped using different population characteristics at the initial stages of sampling and the final sampling units are selected on a probability basis through random sampling. In simple random stratified sampling, call backs are used to obtain the randomly selected participant (Bryman, 2016). The main differences are that for quota sampling, there is no reliance on a sampling frame and selects the first available subject that fits the population characteristic required and no call back is required (Bryman, 2016). While some argue that quota sampling can be as good an alternative to stratified sampling, some studies have observed that quota sampling are not statistically equivalent and representativeness is influenced by the interviewer and also topic of study (Yang & Banamah, 2013). In some situations, a combination of probability and non-probability sample could be the only available option.

Snowballing is a sampling method used to reach hidden populations and may be combined with probability sampling at first, but subsequent respondents are obtained by information provided by initial respondents (Bryman, 2016). Snowballing includes proportionate and non-proportionate sampling; proportionate sampling selects the sample size based on population proportions while the latter has no restriction on a minimal sample to be selected (Etikan & Bala, 2017). Bryman (2016) notes that snowballing is used in quantitative study designs in combination with other methods or when probability sampling is impossible in very specific circumstances when there is need to broaden the reach.

### **Challenges in conducting household surveys in the Maldives**

Most of the household surveys in the Maldives rely on census blocks and island household registers for sampling. However, the practice of household registration, familial living arrangements, and internal mobility of the residents poses a number of challenges to conduct research based on household sampling.

The first challenge is the unique system of dwelling (house) registration in the Maldives. Maldives does not follow the standard street numbering system found in the majority of the countries. Instead each house is given a descriptive name that distinguishes it as a separate dwelling. The local councils of each island maintains a list of registered houses and can be used as a sampling frame. However, the challenge for researchers is the absence of a numbering system that makes it difficult to apply systematic random sampling to select a dwelling. This is more pronounced where some houses do not have their name plates thereby making it difficult to distinguish one dwelling from the other, and in Male' city the congested housing situation with a number of households living in the same dwelling creates confusion in distinguishing households (Riyaz, 2009). Male' city is among the most densely populated capital cities in the world with 41,000 people per square kilometre of land (ITU, 2004). The scale of this congestion can be ascertained from Abdul Raheem, Chih & Binns's (2018) survey findings that report 47.9% of the 458 mothers randomly selected from the outpatient department of two hospitals in Male' reporting living in a single room with more than 3 people. Notably, the remaining 52.1% mothers reported living with at least 3 people in a room.

The second challenge is related to emerging multi-storey houses in the more developed islands, especially in the greater Male' area. While the land law in the country allows condominium registration (strata titling) it is not commonly practiced (Ministry of Housing and Urban Development, 2008). Hence the dwelling continues to be registered as one house, despite many households living in the dwelling. Furthermore, the residents of the dwelling are not consistent with that registered at the local council, since non-permanent residences are not required to be registered.

The third challenge is related to participant selection. Local council records hold information of the permanent residents of the households. This register does not capture the occupants of a dwelling in the medium to short term. An alternate source of this information is the voter's registry which is compiled by the Election Commission of the Maldives, sourcing information from national civil registration system and the household registries which is then made public (Commonwealth Secretariat, 2014). The list is validated with publication of the list and individuals feeding back to update their information on current residential address. Once the list is finalised, it is published in the Government Gazette. The latest available such listing is from the 2018 Presidential election (President's Office, 2018). Since a person can register to vote in a location which is not necessarily the usual residence, this poses some limitations; while it is also the most reliable comprehensive register that has a better representation of the continuous internal migration especially between the islands and Male'. The voters list especially is useful as a sampling frame, as it available in the public domain, includes name, gender, the national identification number, in addition to residential dwelling.

While the voter's list provides a possible sampling frame to select participants prior to fieldwork, making contact with a potential participant poses the fourth challenge. Firstly, the postal service unlike many other countries is not well established in the Maldives, particularly local postage. People in the country rely on domestic interisland vessels and their crew for postal function (Moosa & Koopman-Boyden, 2016). Therefore, arranging a return postal questionnaire is not possible. Secondly, with around 5.8 per 100 inhabitants, use of telephone land lines are not common (Yerbury, Ahmed & Riyaz, 2020). While the growth rate of fixed telephones in households had been stagnant since the late 1990s (ITU, 2004), the current high use of mobile telephones with 246 per 100 inhabitants (Yerbury et al., 2020) presents the opportunity for contacting potential participants by phone as a viable alternative. However, given that the online telephone registry is available mainly for landlines, obtaining mobile phone numbers are restricted by privacy and confidentiality terms of service providers. Hence, contacting potential participants requires reliance on informal modalities (Moosa & Koopman-Boyden, 2016).

The high usage of mobile phones, also widespread access to the internet in the Maldives with 78.5 mobile broadband subscriptions per 100 people (Yerbury et al., 2020), presents promising avenues to overcome the geographical dispersion of the islands. While the internet penetration is high in the Maldives, the cost of internet access is much higher than it is in developed countries (ITU, 2019). Further to this, the digital divide is also a reality with more people in the outer regions of the Maldives having limited accessibility in terms of speed or technological means of access to the internet as well shortage of ICT skills (Riyaz, 2009). Just having the technological access does not ensure fluency in the use of technology (Hargittai,

2002). With swift changes occurring in take up of ICTs in the Maldives, most Maldivians are on one or more social media platforms (Yerbury et al., 2020) with many Maldivians using Viber as the online communication platform.

### **Geographical dispersion, language & culture**

The online survey modality is an ideal cost effective strategy because the geographic dispersion of the Maldives makes inter-island transport very expensive (Latheef & Gupta, 2007). Further to this, major surveys in the Maldives such as household income expenditure surveys carried out by the National Bureau of Statistics (NBS, 2016) and demographic health surveys (MoH, 2018) have adopted stratified sampling approaches due to geographic, demographic and developmental differences between the capital island and others. According to the 2014 census reported by the National Bureau of Statistics (NBS, 2015), the percent share of the atolls varies from 0.5% to 6.2%.

The 1,192 islands of the Maldives are distributed among 26 natural atolls, which are grouped into 20 atoll-units for administrative purposes. The number of islands in each of the atolls varies, with Kaafu Atoll having 107 islands while Gnaviyani Atoll (Fuvahmulah) is an island in itself. Each of the administrative atolls, on average, have 9 inhabited islands. The average size of the islands is less than a square kilometre and only 190 islands are inhabited, with 83% of these islands having a population of fewer than 1,500 (NBS, 2015). The average population of the islands in the atolls (excluding greater Male' area) is less than a 1000, with the smallest population at 74 people and the largest population at 8,226 (NBS, 2015). Of the total population, over 31% lives in Male' city.

There are no urban-rural areas officially recognised in the country and national surveys so far have used Male', the capital island, as urban and the rest of the atolls as rural (ITU, 2004; MoH & ICF, 2018). Each of the 20 atolls have a designated capital island with government officials overseeing the governance of the island in close coordination with the government in Male' (Transparency Maldives, 2019). Following the Decentralisation Act of April 2010, Male' became formally recognised as a city. Apart from Male', Addu atoll consisting of 5 inhabited islands was accorded city status in 2010. This was followed by Fuvahmulah (Gnaviyani atoll) and Kulhudhuffushi (an island from Haa Dhaalu atoll) accorded city status in 2016 and 2020 respectively (President's Office, 2020).

Maldives is united with a common religion and language. Dhivehi is the only local language spoken in the country, with slight dialectical differences in some atolls and significant differences in the southern four atolls. The official dialect is spoken in Male' and this dialect is understood and fluently conversed by all Maldivians (Fritz, 2002). Dhivehi language is written in Thaana script, which is written from right-to-left with the diacritical marks similar to Arabic language, and is the same across all Maldivian dialects (Ibrahim, 2018). With Unicode standard Thaana script enabled to be displayed on computer systems (Garfinkel, 2012), with minor limitations (Ibrahim, 2018), an online questionnaire in the Dhivehi language is a promising possibility. This can be optimal, to overcome the lockdown measures, for prompt and convenient survey completion given that the questionnaire can be accessed using ICTs gadgets widely in use.

While VIC survey is designed as a cross-country survey, and should ideally

be applicable to diverse cultures and religions of the world, it had a predominant emphasis on Christianity as the mainstream religion. Therefore, replicating the questionnaire in the Maldives required careful consideration. With its more than 800 years of Islamic religious identity, and the only religion practiced in the country, the Maldives culture is strongly centred around Islamic orientations (Pijpe et al., 2013).

With this unique cultural backdrop, Maldivians have a unique cultural bonding where personal privacy is overridden by familial and communal responsibilities. This flexibility allows possibility of accessing randomly selected prospective participants using the aforementioned voters lists, especially clustered into smaller units with a person from that community assigned the role of participant selection and facilitation of the survey.

### **Methodology**

The data collection for the VIC survey was carried out by 20 facilitators and the data collection experiences are derived from their evaluation/feedback questionnaire, and from the de-briefing focus group discussions held after data collection. The validity and reliability of the survey sample are derived from statistical tests on comparable demographic data collected from the 1026 participants of the VIC survey and against the 2016 national household income and expenditure survey in the country. The following sections first provide an overview of the methodology of the VIC survey followed by descriptions of the facilitators as key informants in data collection experiences.

#### **Representative survey sampling & survey execution**

The participants for VIC survey (wave 1) were determined to consist of a panel of at least 1,000 respondents from across the Maldives. Given the lockdown situation in the country, with travel restrictions between the islands, the methodology called for a self-administered online survey. Additionally, it required the collection of participant details such as name, address, age, and contact phone number separately, with the aim of inviting them back to participate in wave 2 and 3. The completion of the data collection within a short timeframe was also important in order to make use of the lockdown situation in the uncertain and quickly evolving pandemic.

#### **Sample clusters & stratification**

A multi-cluster stratified systematic random sampling approach was targeted for, with stratification on urban-rural communities, gender and age of the population. The urban and rural clusters were pre-determined using a representative sampling approach of maintaining a ratio of 40% urban and 60% rural community participants. For the purpose of this survey, the urban and rural contrasts are utilised with the following defining distinction.

The urban regions are taken as all the islands/atolls that have been assigned city-status by the government of Maldives. These include: Male' city (comprising of Male', Villimale, & Hulhumale), Addu city (Seenu atoll), Fuvahmulah city

(Gnaviyani Atoll), and Kulhudhuffushi city. Based on the larger population, to ensure manageable clusters for each facilitator, the Male' was divided into sub-clusters using the districts of Henveiru, Galolhu, Maafannu, Machangolhi, Villimale, Hulhumale.

The rural clusters are derived from the remaining atolls of the Maldives, excluding the capital islands of each atoll. The capital islands are excluded as these islands are the Atoll's government hub with government offices, atolls schools, and also the commercial hub servicing the rest of the island in the atoll and therefore is believed to differ significantly from other remote islands of the atoll. These islands can be equated to towns but not cities. They were not considered for the urban category, because this could compromise the comparability of findings from VIC survey across other national surveys. In general, with national household surveys, focus is on Male' region versus the outer atolls. Subsequently, 18 clusters were drawn from each of these atolls to constitute the rural sample.

The sample size for these clusters were derived proportionately based on the population of the cluster city/atoll targeting a sample size of 400 from urban and 600 from rural clusters. Table 1 and Table 2 shows the cluster sampling of the urban and rural clusters respectively.

Table 1  
*Sample Size For Urban Clusters (Population Data Source NBS, 2015)*

Urban Clusters	Male'	Vilimale	Hulhumale	Kulhudhuffushi	Fuvahmulah	Addu	<b>Total</b>
Population	109,498	7,516	16,398	8,226	8,095	19,829	<b>169,562</b>
Sample	258	18	39	19	19	47	<b>400</b>

Table 2  
*Sample size for rural clusters (Population data source NBS, 2015)*

Rural Clusters	H.A.	H.Dh.	Sh.	N.	R.	B.	Lh.	K.	A.A.
Population	13,004	10,344	12,127	10,556	14,934	8,919	7,996	12,232	5,915
Sample	48	39	45	39	56	33	30	46	22

Rural Clusters	A.Dh.	V.	M.	F.	Dh.	Th.	L.	G.A.	G.Dh.	<b>Total</b>
Population	8,183	1,622	4,711	4,140	5,329	8,923	11,841	8,447	11,653	<b>160,876</b>
Sample	31	6	18	15	20	33	44	32	43	<b>600</b>

The sample size from each of the clusters were drawn using the following gender and age stratification. The latest census data for 2014 (NBS, 2015) calculates the total population at 174,666 males (51%) and 169,357 females (49%). The target was to maintain this proportion in the sample. Likewise, the age representation was

targeted proportionately for an accurate representation of the population. Table 3 shows 2014 census data for the over 18-year age categories. The target sample by age group for each cluster was calculated using the percentages detailed in the last column.

Table 3  
*Population size in the above 18-year-old age categories (Data source NBS, 2015)*

Age	Male	Female	Total	Total %
18-24	19,349	18,537	37,886	17%
25-34	34,945	35,606	70,551	32%
35-44	21,197	21,582	42,779	20%
45-54	16,429	16,200	32,629	15%
55-64	9,358	8,594	17,952	8%
65+	8,668	7,751	16,419	8%
<b>TOTAL</b>	<b>109,946</b>	<b>108,270</b>	<b>218,216</b>	<b>100</b>

### **Quantitative questionnaire**

The survey was conducted using a fully standardized questionnaire that is being used in a number of countries and consists of randomized experimental tools to see whether people react in their responses to varying stimuli that depict the COVID-19 crisis in different degrees of severity. The questionnaire consists of 40 closed-ended questions with multiple choice answer options requiring at least twenty minutes to complete. Slight adjustments to three questions were made to adhere to cultural sensitivities. The questionnaire was prepared using the online questionnaire tool, Google Form.

The questionnaire was checked for face validity through expert opinion and pilot testing. Pilot testing was conducted through 10 participants, after translating the questionnaire into Dhivehi language. The Cronbach's Alpha value of the constructs with scaled variables were above 0.93 indicating a relatively high internal consistency and thereby confirms the reliability of the instrument.

### **Participant recruitment**

To overcome the practical difficulty of locating prospective participants physically, especially in the Male' city with the lockdown and the movement restriction measures across the Maldives, it was decided to use the latest voters' registry as the sample frame. Accordingly, participants were recruited through phone calls, with the online survey link texted to their mobile number.

In each of the clusters, the assigned facilitator randomly selected participants using the gender and age quotas described above (see Table 4 for an example), using the 2018 presidential election voters' list by selecting every *n*th individual with a different address. The list was sorted in the order of addresses. Because gender and age categories had to be considered, and because the number of registrants for a particular address will vary, the *n* varied within and across clusters. With the sample drawn, facilitators can then use their personal network to find phone numbers for the selected prospective participants.

Table 4:  
*Example of target stratified sample for two rural clusters*

Haa Dhaalu Cluster	Target		Gaafu Dhaalu Cluster	Target	
Age group	Male	Female	Age group	Male	Female
24-18	4	3	24-18	4	4
34-25	7	7	34-25	7	7
44-35	4	4	44-35	4	4
54-45	3	3	54-45	3	3
64-55	2	2	64-55	2	2
+65	2	2	+65	2	2
<b>Subtotal</b>	<b>22</b>	<b>21</b>	<b>Subtotal</b>	<b>22</b>	<b>22</b>
<b>TOTAL</b>	<b>43</b>		<b>TOTAL</b>	<b>44</b>	

It was envisaged that seeking mobile numbers for a probable sample from smaller island clusters can be possible, while in the greater Male' area it would be challenging even through personal networks. Even though more addresses in Male' do have a landline and these can be retrieved from Dhiraagu online phone directory, it was decided not to use this as this will create discrepancies in the sampling frame for Male' city and other clusters. Therefore, the strategy was to allow flexibility to reach prospective participants using facilitators' personal networks, but using the strata for gender and age and also ensuring no two persons were selected from any given address to obtain the quota for each strata. The facilitators continued this process of participant selection from different households until the required number and quota of consenting participants had been achieved for that cluster. In the rural clusters emphasis was placed on selecting half of the sample from a larger island and the other half from a smaller island within that cluster atoll.

When the prospective participants agree to participate, the facilitator forwarded the online questionnaire link to the identified participant via a text message to their mobile phone or through Viber. The facilitator later calls back the respondents to ensure they have submitted the survey response. If any of these prospective participants later refuses to participate, the facilitator will find a replacement using the earlier quota.

In order to maintain the strata of gender and age of participant selection and also for the purpose of the panel identification for future two waves of the survey, the facilitators were required to collect the name, age group, address, and mobile number of every person they contacted. This register is an important tool for the subsequent two waves of the VIC survey because only the registered participants will be invited to participate. In doing so, the facilitator had to keep a register of people they call, who agree or did not agree, and of those who agree whether they responded back to say that they have completed the submission.

### **Facilitators as informants**

The survey data collection was carried out during the last week of May 2020, in 27 clusters by 20 survey facilitators, with a few of the facilitators assigned more

than one cluster, depending on their familiarity with the communities. The facilitators were selected by the research team, selecting trustable facilitators who could carry out the task efficiently and complete the recruitment within a week of active survey recruitment. The facilitators were provided a pre-briefing training on the purpose of the survey, the importance of a representative random sample, and ethical conduct of phone calls in order to initiate conversation and also get consent for participation in the survey.

All contacts with the facilitators were conducted online or over the phone. The pre-briefing training was conducted using Zoom video call. The online media communication platform Viber was utilised as the group communication channel to maintain contact between the 20 facilitators and the members of the research team, in order to share information instantly and also for quick assistance in any aspect of participant recruitment.

Through this Viber group, a tabulated update on the status of the number of forms received from each cluster, to the live survey questionnaire hosted on Google forms, was shared at the end of the evening and mid-morning every day. These helped the facilitators to see if their targets were being achieved and motivated them to call back their cluster respondents, and if needed find alternative prospective participants. Apart from this, the facilitators had no way of knowing if the prospective participant had completed the self-administrated questionnaire even though they agreed to do it, as no personally identifying data was collected through the questionnaires.

After the completion of data collection, the facilitators completed an online evaluation/feedback questionnaire. Open-ended questions were used asking facilitators to expand on their experiences and interaction with the survey participants, experiences of random participant selection in terms of ensuring representativeness, and challenges the facilitators identified from the prospective participants in engaging with the survey tool.

## **Data analysis**

The demographic data from the VIC survey were analysed using the Statistical Package for social sciences (SPSS). Frequencies and percentages were calculated for the categorical variables “household income” and “educational qualification”. The data from the facilitator feedback questionnaire and the focus group de-briefing discussion were analysed thematically according to facilitator experiences.

## **Results**

### **Participant recruitment**

Participation in the online survey was by invitation only, whereby the facilitators sent the hyperlink of the survey questionnaire, to the participants’ mobile number. A total of 1179 prospective participants were invited, with 893 (76%) respondents (362 urban and 531 from the rural community) confirming completion (see Table 5). However, a response rate of 87% was achieved with 1026 completed usable questionnaires. Notably, 1093 questionnaires were received through the online

portal of which 67 questionnaires were removed at the data cleaning stage, as these forms were obvious duplicate submissions. The reason for the multiple entries can only be assumed to be technical network errors.

Table 5  
*Survey response rate*

Age	Target		Contacted		Registered		Questionnaires completed	
	Male	Female	Male	Female	Male	Female	Male	Female
18-24	39	36			34	38	45	49
25-34	66	66			51	53	65	70
35-44	42	41			38	40	44	54
45-54	34	31			24	32	22	34
55-64	20	18			12	15	13	18
65+	18	16			11	14	8	11
Subtotal (Gender)	219	208	244	210	170	192	197	236
Subtotal (Urban)	427	454	362	433				
18-24	56	54			48	47	47	53
25-34	96	97			82	91	106	113
35-44	60	58			60	62	62	74
45-54	46	43			42	30	36	33
55-64	26	26			19	17	17	20
65+	26	24			17	16	17	15
Subtotal (Gender)	310	302	354	371	268	263	285	308
Subtotal (Rural)	612	725	531	593				
<b>Grand total</b>	<b>1039</b>	<b>1179</b>	<b>893</b>	<b>1026</b>				

As shown in Table 5, while the target of 1039 was almost achieved with 1026 questionnaires received, facilitator register shows the total registered in the survey to be 893 participants. The implication is that the second wave of the survey will be limited to these registered participants only.

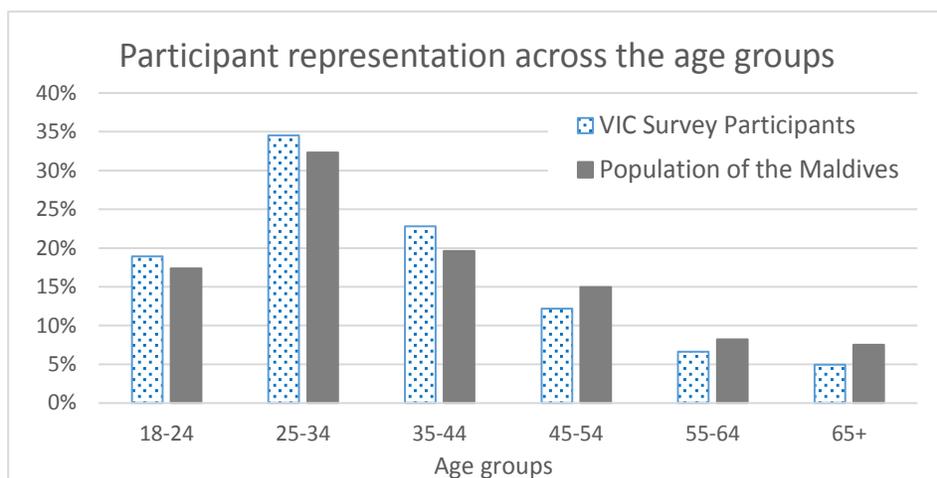
The majority of the 1026 participants self-administered the questionnaire, with a few of the older participants getting help from family members. Only 18 participants (13 females and 5 males above the age of 55) across 14 clusters stated they needed assistance from facilitators. The reasons ranged from not having a smart phone or internet access, inability to view the form on their phones (faulty font

display), and limited digital fluency.

### **Stratified demographic representation (gender and age)**

The recruited urban (42%) versus rural (58%) sample (questionnaires received) are closely matched to the target sample of 40% urban and 60% rural participants. However, facilitators reported having comparative difficulty recruiting male versus female participants, thereby reaching 43% male (target 51%) versus 57% female (target 49%) participants. Participants were only recruited above 18 years of age. The age distribution of the survey participants was shown earlier in Table 3. The comparison ratio of the sample against the population for the target age groups is shown in Figure 1.

In both rural and urban clusters, it was challenging to recruit people above 45 years. With the 45-54 groups there were more non-response after agreeing to complete, and with the 55 and above groups, there was notably a low number of people who were reached in this online modality of survey recruitment.



*Figure 1:* Survey participant representation across the population age groups

### **Experiences from the facilitators**

After the completion of the data collection, the facilitators (7 males and 13 females) completed an evaluation feedback questionnaire. The age of the facilitators ranged from 27 to 40 years, with 76.2% of the facilitators in fulltime employment mostly in the public sector. Of the 20 facilitators 7 are residents of Male' and the remaining from other atolls. The facilitator feedback questionnaires were followed by two debriefing meetings held online with the 20 facilitators who were divided into two groups with 10 facilitators in each. The online meetings lasted approximately 70 minutes. One of the aims was to hear the first hand experiences of facilitators through the focus group discussion. The experiences from these interactions are presented thematically.

### **Systematic random sampling & the use of mixed methods**

The voters list was the only standard reference available in order to select a systematic random sample. This document contains the name, gender and address, but does not specify age and the contact number of the individuals. Therefore, the facilitators first had to draw a random sample from the list and then obtained mobile numbers from personal networks or public offices through a contact. Once contacted, and the designated quota for certain age groups were not met, there were instances where facilitators had to go back to the sampling frame to draw another random sample list because some of the participants on the earlier list were in groups where the age quota has been met. Thereby, almost all the facilitators reported difficulty in recruiting participants solely depending on the voters list. Accordingly, the discussions revealed that most facilitators depended on personal networks (e.g. Viber groups, family and friends) to seek phone numbers of prospective participants as well as to recruit participants.

An example of strategies from Gaafu Dhaalu (GDh) cluster reported was that, as a first step the facilitator used the voters list to derive a sample based on gender. After that, selected prospective samples using nth listing and used personal contacts to get the phone numbers of the prospective participants. Not everyone consented to participate. When the targeted number of samples were not met with the voters list, the facilitator reported that they resorted to snowball sampling ensuring no two participants were from the same house. Haa Dhaalu (HDh) facilitator stated that as a first step, he checked the voters list and drew a random sample of the target total of 42 participants, based on gender. Half way through he realized without knowing the age of the participants he was repeatedly calling people of the same age groups. Hence, as a next step an attempt was made to obtain these personal details from personal sources first, and redrawing a sample and repeating the same process. The stratified target sample size for these two clusters (HDh and GDh) was shown earlier in Table 4.

In one of the Male' city clusters, in consultation with the research team, the facilitators used a school 'Viber community' as an alternative approach to draw a random sample. Most school Viber community listing contains 1000s of parents and they can be contacted via Viber even though phone number is not visible. Furthermore, other informal networks were utilised such as using FB to seek prospective participants. Once they were identified, the facilitators check the prospective participants' age and address to ensure conformity to the sampling quota.

### **Participant recruitment conforming to the stratified groups**

The facilitators highlighted difficulty in recruiting participants from some sample categories.

Facilitators from Faafu (F.) and Dhaalu (Dh.) atoll reported that it was difficult to obtain participants aged above 65 years to consent to participate in the survey. Nevertheless, facilitator from the Gaafu Dhaalu (G.Dh.) reported that she got a lot of support from the elderly participants. Interestingly, the facilitator from the Gaafu Dhaalu atoll reported that the most challenging was to get the younger age group of 18 to 24 to agree to participate, however, noted that they were more re-

ceptive when she mentioned that it was an international survey.

From Fuvahmulah city, the facilitator reported that due to the nature of her job, she deals with a variety of people every day and hence it was not difficult for her to call the randomly drawn list of people and ask for consent in filling the survey questionnaire. She reported using contacts in a public office to seek mobile numbers for the sample list. Similarly, Haa Dhaalu (H.Dh.) facilitator also emphasized the ease with which people agreed to fill the survey questionnaire based on the fact that most people in the population knew him and therefore was easier to call, talk and get consent.

A facilitator from Male' and a few from other atolls also noticed that men were less responsive than women. The reason was not clear as this was not pursued.

### **Trust as an important factor in consenting to participate**

Answering to the question about how well or badly were calls received by the respondents, the facilitators reported that there were instances where respondents were suspicious and even irritated by the call. However, they also reported that most of the time, respondents were cooperative.

The most hostility was reported where the facilitators were not from that immediate island community. Complaints such as "it is an odd time to call for a survey" or being rude stating that the facilitator need not ask COVID-19 related questions to them and they could obtain this information from the government officials. One facilitator reported being asked if they have any kind of reference papers to prove who they are and what rights do they have to ask questions that were posed. One facilitator also reported the questionnaire being politicised.

Alif Dhaalu (A.Dh.) facilitator highlighted that many people that she contacted initially agreed to fill the survey and hence the questionnaire link was sent, but did not complete or respond to call backs. It was felt that people were hesitant to reject participation straight away and therefore said yes just to appease the facilitator, to get off the call.

It was also observed that people were more responsive if someone from the community had informed them about the survey prior to facilitator calling them. The reason being trust is instantly formed when a friend or acquaintance calls and the threat of information leaking in any form is invalidated.

More facilitators from Male' clusters highlighted similar mistrust issues. Many were particularly wary that their personal details were being asked during the initial call (confirmation of address & name) even though that information was not collected on the questionnaire.

### **Technical issues with the online survey questionnaire**

One facilitator reported that, while administrating the questionnaire as an interview it was noticed that one elderly participant hesitated to count their government allowance with the household income. It was also observed that culturally sensitive questions such as on religiosity, abortion, and divorce made some participants uncomfortable.

A few facilitators reported that there were participants who complained about

the wordiness and length of the questionnaire after completing. Additionally, technical issues such as the horizontal and vertical grid questions made it difficult for some participants to read through the questionnaire.

Other issues included limitation of Google forms such as the “submit” button being English and could not be translated to Dhivehi. It was noticed that after filling the questionnaire, many did not press the submit button. This was realized during the second day of data collection and, rectified by adding a sentence at the end of the questionnaire with directional details.

Some participants, especially the youth expressed preference to fill an English questionnaire, as they are not fluent in Dhivehi as much as English.

### **Technological barriers**

Facilitators also reported that in few rural clusters, some of the respondents did not have Viber or any other similar social media presence thereby the sharing of the questionnaire link was problematic. This was most prominent in the atoll/island clusters and with older age groups. Few respondents did not have internet or smartphones. Furthermore, there were instances with the elderly age groups where they had the required technology but lacked the digital fluency. Therefore, some participants did not know what to do after opening the link. In similar cases, facilitators offered the option of an interview, but quite often they were rejected and had to try and find alternative participants.

### **Other challenges**

Some respondents were in quarantine facilities where network was not good. Network issues were reported by many other participants from their home locations too. A few participants reported having attempted the questionnaire multiple times, assumedly owing to network issues. Facilitators also reported that the survey timing coinciding with the end of the month, some of the respondents had run out of their monthly phone data allowance and therefore were not able to attempt the online questionnaire.

Another constraint was the timing of the survey coinciding with the Shawwaal fasting period. Facilitators had difficulty figuring out what would be an acceptable time to call, because for women, afternoon is quite hectic with cooking for the iftar meal, and many adults of both gender catch up on sleep in the early hours of the day after having spent late night on prayers. It was noticed that most participants submitted their questionnaire late evening after around 9 pm or early in the morning before 7 am.

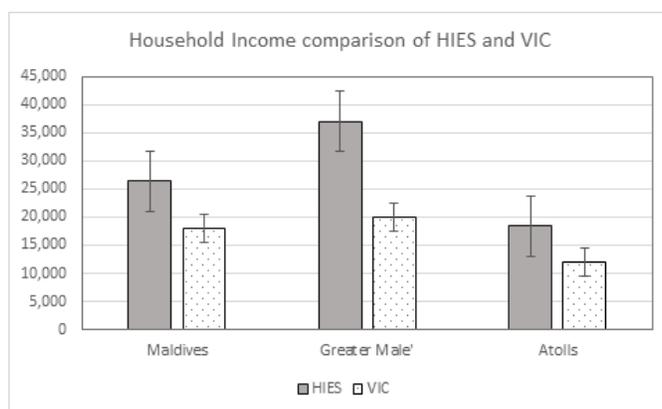
In one rural cluster, the facilitator reported the timing coinciding with a COVID-19 active sample collection on that island. Therefore, many participants from that cluster refused to join the VIC survey assuming that participation in the survey would mean they will be asked for a COVID-19 swab sample.

In summary, irrespective of these challenges, facilitators reported that the overall participant recruitment was a positive experience, with many supportive participants. This is evidenced in the receipt of 1026 completed questionnaire from across the Maldives within 6 days of data collection. The facilitators were confident that they have selected a sample that is representative of the respective clusters.

### **Representativeness of the sample and data reliability**

The following section presents the statistical reliability of the sample to determine whether the sample can be considered representative of the population.

Since the gender and age parameters were targeted as a representative proportion of the population, and the sample was selected until the required numbers were reached more or less, there were no obvious errors shown in the representativeness in terms of gender and age groups. Hence other variables such as household income and educational qualification from the VIC survey data were compared with Household Income and Expenditure Survey (HIES) (NBS, 2016).



*Figure 2: Comparison of household income of HIES and VIC survey*

The data (see Figure 2) shows that there are no statistical differences in the average household income of the atolls when HIES and VIC Survey are compared. However, there is a significant statistical difference in the average household income of greater Male' when the two surveys are compared. This difference is observed for the whole Maldives as well, although the difference is smaller.

Furthermore, there are no statistically significant differences in most of the categories of the educational levels between HIES and VIC Survey. The VIC participants are above 18 years of age. Therefore, only the comparable age group from HIES is utilised. For males (figure 3), main differences are seen in primary and university education categories. For females (figure 4), in addition to the aforementioned two categories, there is a difference in secondary education between the two surveys. There is a significant increase in higher education levels for both males and females in the VIC survey compared with the HIES.

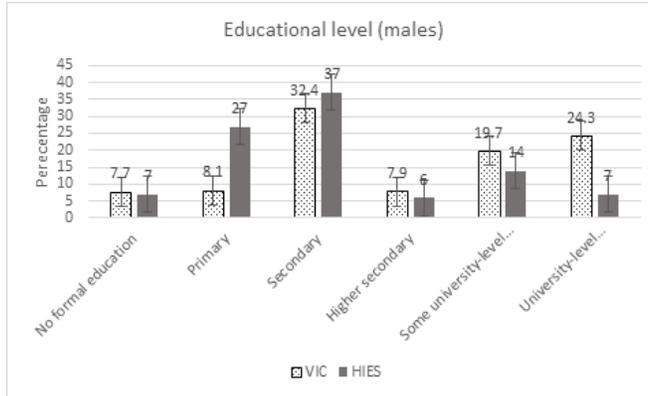


Figure 3: Education level (male participants in VIC survey against HIES)

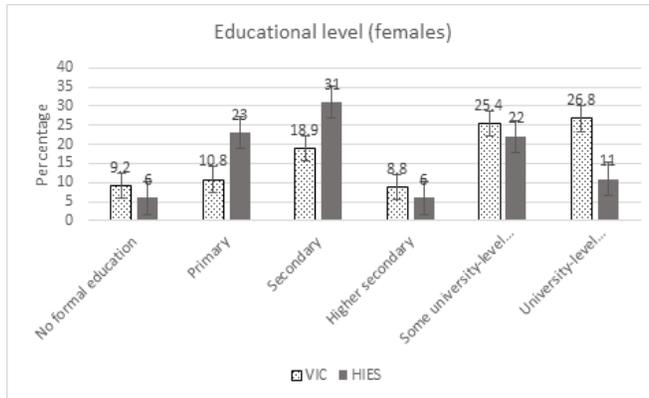


Figure 4: Education level (female participants in VIC survey against HIES)

### Discussion

Having recruited over 1000 participants within 6 days of participant recruitment and achieving %87 response rate, to complete a questionnaire that takes at least 20 minutes to complete, shows that a multi-cluster random sampling can be applied to participant recruitment for online surveys. The use of the voter list (President’s Office, 2018) to select participants from every nth household from the list helps to simplify systematic participant identification challenges that was identified in earlier surveys (e.g. Riyaz, 2009). The challenge in VIC survey was in securing contact numbers in the absence of an accessible telephone directory coupled with low use of landline home telephones. The absence of age on the voter list created challenges with the systematic sampling as facilitators had to go back to the list to redraw samples to meet the age quotas.

Further, the survey facilitators used a combination of methods in drawing up

a random list of prospective participants using the voters list and then resorted to personal networks (as was highlighted by Moosa & Koopman-Boyden, 2016) to secure phone numbers as well as to seek additional participants. The stratified sampling approach was adhered to at the urban-rural cluster level, and to a large extent with gender strata. However, at the participant selection level, especially to adhere to the strata of age groups, mixed strategies of quota sampling and snowballing was adopted ensuring not more than one participant was recruited from any household. As Gary (1990) states, while quota sampling is a non-probability sample, probability sampling with quotas is possible and is used for some household-based studies even though there are some level of bias.

The movement restriction measures hindered reaching the technologically challenged group of people who mostly are the elderly and/or those without an online presence, and assumedly having a lower socio-economic status. However, the high internet penetration levels in the Maldives, reported in prior studies such as Yerbury et al., (2020), appears to be universal with not more than 18) %1.5) of the selected sample reporting not having internet access on their phones and another 14) %1.2) of the contacted sample requesting for assistance in questionnaire completion. Challenges were that of limited access to internet connectivity owing to high cost of phone data, and lack of know-how in the use of technology, or limited data balance of mobile internet packages especially as it was the end of the month. These findings show that the earlier identified digital divide (Riyaz, 2009) has diminished but continues to exist mainly as a deficiency of digital fluency mostly among the elderly population and mostly from the rural clusters.

Overall, the facilitators' experiences of recruiting participants through phone calls had its challenges of the balance between personal privacy and commonly accepted cultural norms. Reaching the geographically dispersed islands were countered effectively and efficiently with online and phone recruitment methodology that overcame the cost and time of travel that is usually associated with similar national surveys across the Maldives. Further to this, having to call prospective participants on their mobile phones was felt somewhat intimidating and sometimes unwelcome by respondents. Additionally, the need for personalised invitation by reputable or known individuals are common to that echoed in earlier survey research (e.g. Perkins, 2011). It was also more difficult to gauge the age of the prospective participant in calling phone numbers without seeing them in person unlike in a door-to-door survey recruitment. This experience was more common in the city clusters, of Male' and Hulhumale, with large population sizes. With smaller clusters people know each other in the community by name, and therefore the challenge was not so pronounced.

Accordingly, facilitators ensured stratified probability sampling was practical despite the challenges. Since statistically significant differences was not observed in the measures, such as average household income and education levels of VIC survey participants and other nation-wide surveys such as HIES (NBS, 2016), it can be concluded that the sample is representative. The difference in the average household income of greater Male' can be because the data was collected while Male' was in lockdown status. The rapid livelihood assessment carried out by the Ministry of Economic Development (MED, 2020) highlights the drastic job losses experienced immediately following the resort closures due to the pandemic.

Likewise, the education status of participants from HIES (NBS, 2016) compared with VIC survey shows a slightly larger proportion of both male and female participants with higher qualifications in the VIC survey. On the one hand this could be a result of the challenges in the accessibility to participants

with limited connectivity. On the other hand, the higher education level for both males and females in the VIC survey compared with the Housing and Income Expenditure Survey (NBS, 2016) may be because the two surveys are four years apart and there has been a significant change in the delivery of education, especially higher education.

### **Conclusion**

In conclusion, the participant recruitment for VIC survey across the Maldives in the midst of the COVID-19 pandemic was carried out successfully with a response rate of %87 without physical access to the 1026 participants. The survey was completed within 6 days in May 2020 while the greater Male' area had been in a lockdown for 6 weeks, and with movement restriction across the rest of the country. While probability sampling proved to be challenging without the physical access and limitation in the sample frame, the facilitators managed to recruit a representative sample following the gender and age quotas. The main challenges were in obtaining phone numbers especially in the larger clusters, reaching the older age groups, lower completion rate from males especially from city clusters, some difficulty in digital access in the rural clusters, and mistrust about the survey when the facilitator was unknown. Despite the challenges, the statistical tests on the participant characteristics, against existing comparable household surveys, concludes the sample selected amidst the COVID-19 crisis has a true representation to the population. The implication of this outcome highlights the adaptability and applicability of established quantitative research methods to a geographically dispersed small island developing state, as well as to nonconventional situations, and the reliability of social networks in recruiting a representative sample.

### **Acknowledgement**

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