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Final Report

BY MISS MASHCHIMAPORN SONGSANG

FRIEND FROM THAILAND VOLUNTEER

ROYAL CENTRE FOR DISEASE CONTROL, MINISTRY OF HEALTH, THIMPHU, BHUTAN

Final Report

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Position: Thai Volunteer, Laboratory Technologist

Work Place: Virology & Molecular Laboratory, Royal Centre for Disease Control, Ministry of Health Thimphu, Bhutan

Work Duration: 27th October 2019 to 26th April 2021

Preference

This final report summarizes all of the work outputs and achievements completed by Miss Mashchimaporn Songsang, a Thai volunteer under the Friends from Thailand Program. I was assigned as a Laboratory Technologist in Virology & Molecular Laboratory (VML) to work for 18 months at the Royal Centre for Disease Control (RCDC), Ministry of Health Thimphu, Bhutan. In this connection, I would like to present my appreciation to Thailand International Cooperation Agency (TICA) in providing an opportunity to me to participate in the said programme.

In addition, I would also like to thank the Bhutanese Government, the VML, and RCDC colleagues for their kind supports and warm friendship for the whole 18 months of my assignments in Bhutan which led to the successful of my accomplishments.

Contents

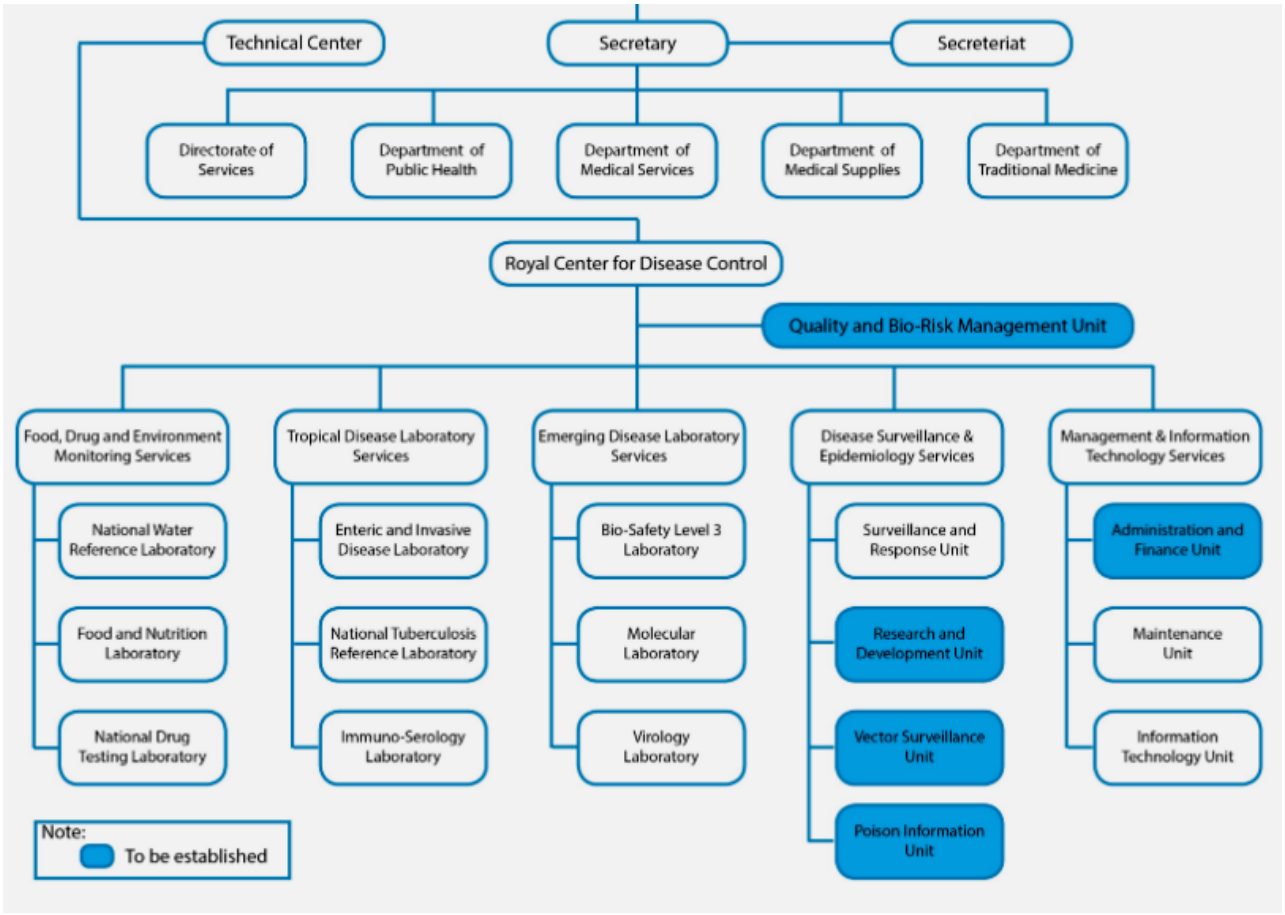
Introduction

1. Royal Centre for Disease Control (RCDC)

The centre was established in 2016, located in Serbithang, Thimphu. The center has been services and looks after any disease control occurrence in Bhutan by following mandates

1. Conduct surveillance on public health important diseases (Annual Health Conference in 2009 directives).
2. Conduct outbreak and response (Annual Health Conference in 2009 directives).
3. Provide reference laboratory services for public health important diseases (Annual Health Conference in 2009 directives.
4. Monitor food and water public health safety (Water Act 2012).
5. Monitor the quality of medicinal products/pharmaceutical drugs (Medicine Act 2003).
6. Testing narcotic and psychotropic substances (NDPSSA Act 2005).
7. Provide information on poison and its management (DoPH directive 2013).
8. Responsible for laboratory services quality assurance (MoH directive 2017).
9. Conduct basic and applied research (MoH and DoPH directive 2009).
10. Develop capacity of health professionals in laboratory science and epidemiology (Annual Health Conference in 2009 directive).

As well as including 10 unites in the organization (below attachment)



Organogram of RCDC organization

2. Virology & Molecular Laboratory (VML)

Currently the laboratory works on Virology and molecular testing, as well as observation on influenza Like illness and Severe Acute Respiratory infection which are associated to influenza and other respiratory pathogens (RSV, HMPV, HPIV-1, 2,3, Adeno virus) by using Reverse transcription polymerase chain reaction (RT-PCR) method.

There are 5 permanent staffs working in VML as following attachment

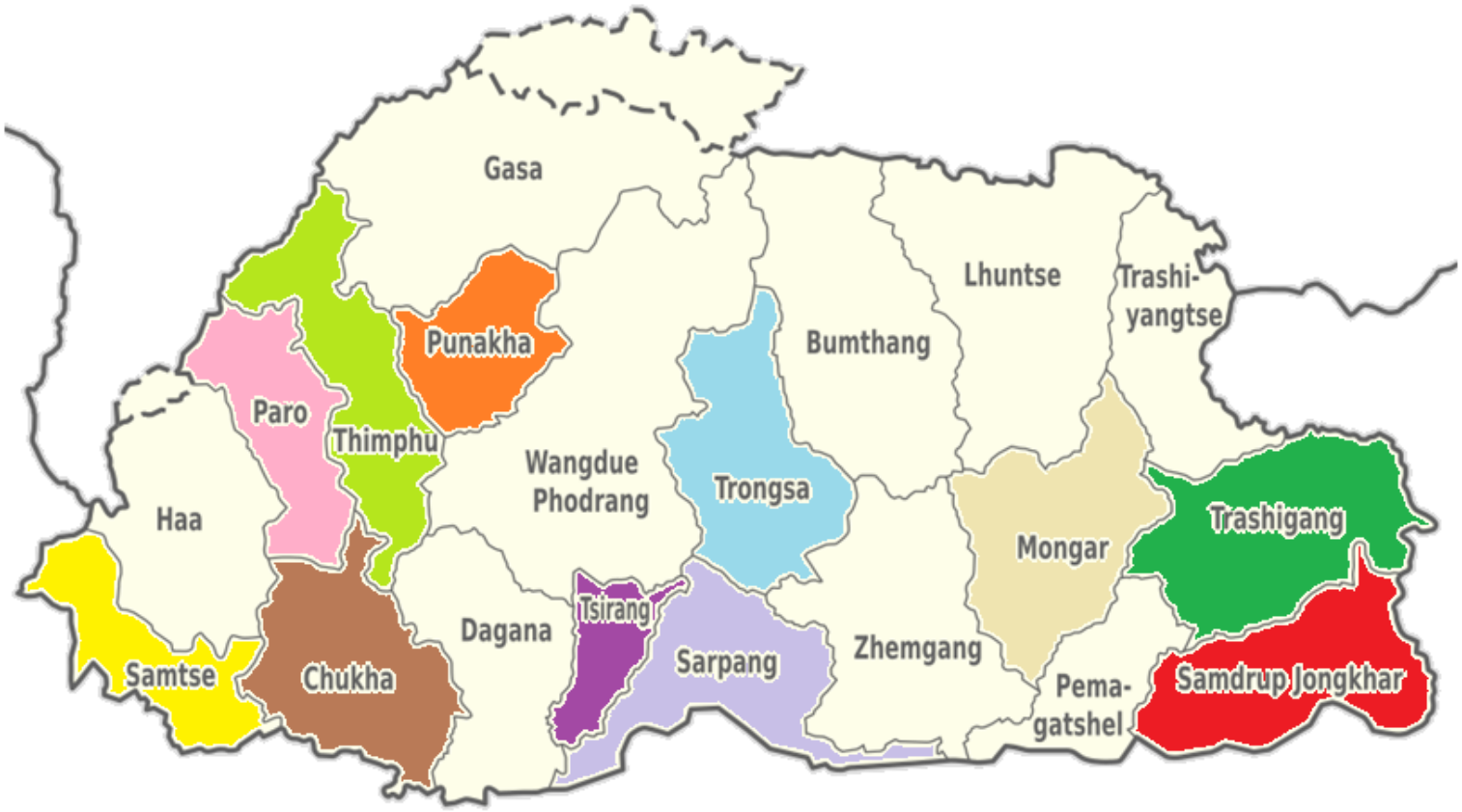
VML staffs

Objective 1

Support the laboratory in Bhutan Influenza surveillance project

- **Activities & Achievement**

In Bhutan, respiratory illnesses are major public health concern and be found as common disease affecting to mortality in human which as general population in the country especially by Influenza virus. Sever Acute Respiratory Infection (SARI) & Influenza like Illness (ILI) projects have been carried out since 2010 to observe and collected the data about Influenza viruses which burden from 11 sentinel hospital in Bhutan including sites as below map. SARI surveillance project were supported budget and consultant by US Centers for Disease control (US-CDC) and World Health Organization (WHO) and ILI project in collaboration with Armed Forces Research Institute of Medical Science (AFRIM),Thailand. This surveillance is a sentinel based activity with primary objectives to characterize the circulating influenza viral strains and study the burden and epidemiology of influenza virus infection in the country.



Sentinel site map for SARI & ILI surveillance

11sites for SARI covered all over regions hospital in the country including, Thimphu, Paro, Phunakha, Samtse, Chukha, Tsirang, Sarpang, Trongsa, Mongar, Trashigang and Samdrupjongkar

7 sites for ILI including Paro, Phunakha, Samtse, Tsirang, Trongsa, Trashigang and Samdrupjongkar

Objective of SARI & ILI Surveillance

1. Describe and monitor the seasonality of influenza activity.

2. Establish baseline levels of influenza Like illness and Severe Acute Respiratory infection which are associated to influenza and other respiratory pathogens (RSV, HMPV, HPIV-1, 2,3, Adeno virus).

3. Monitor outbreaks of influenza during and outside the influenza season.

4. Monitor circulating seasonal influenza viruses and detect novel viruses.

5. Contribute country influenza virus strain to WHO vaccine strain selection.

6. Identify and monitor groups at high risk of severe disease and mortality.

Reference to: Operational Guideline for Influenza-like Illness and Severe Acute Respiratory Infection Surveillance Thapa, et al 2019.

How to operate SARI & ILI surveillance

Surveillance focal person trained nurse and doctors at the sentinel hospitals identify patients who have symptoms measured fever more than 38 ºC, cough or sore throat and symptoms onset within the last 10 days.

Focal staffs collect the respiratory specimen by nasal or throat swab from patient by using Viral Transport Media (VTM) or Universal transport Media (VTM), fill up collection form and ship the specimens to RCDC under controlled temperature.

Focal staffs (laboratory technicians at the sentinel hospital) report SARI & ILI cases to RCDC.Molecular laboratory in RCDC perform molecular detection and characterization ofInfluenza viruses by using real-time RT-PCR and upload result in base data system.

Perform weekly, quarterly and annual report about testing result by RCDC.

Share the results to WHO, US CDC and AFRIMS collaborating centers.

RCDC allocate yearly plan for monitoring and evaluation (M&E) at the sentinel site to monitoring to routinely assess and monitoring of the surveillance system as well as surveillance data and surveillance consistency.

RCDC allocate yearly refresh training for medical staffs who handling for surveillance at the sentinel sites.

- **Activities & Achievement**

1. Attained workshop on SARI-ILI surveillance

National human influenza surveillance is an on-going routine activity carried out by the Royal Centre for Disease Control (RCDC) in collaboration with US Centers for Disease control (US-CDC). This surveillance is a sentinel based activity with primary objectives to characterize the circulating influenza viral strains and study the burden and epidemiology of influenza virus infection in the country. In the past five years, the surveillance has seen tremendous achievements in terms of characterizing circulating influenza viral strains, determining burden, seasonality and high-risk groups.

However, operation of the surveillance in the sites has remained a challenge for the health workers, mainly because of high turn-over of staff and their competing priorities in clinical works. Annual training of health workers from sentinel sites on the national human influenza surveillance protocol is seen as an effective measure to ensure continuity of the surveillance whereby the participants are not only trained on the protocol but are also given the opportunity to express problems faced in their respective sites for discussion.

The training involved 4 facilitators from RCDC and 40 participants from various sentinel sites.

- Workshop Duration: 3 days 23th -25th December 2019
- Location: Bumthang district, Bhutan

Workshop Agenda

Day 1 (23th December, 2019)

The opening of training consisted mainly of introduction and familiarization of participants to various aspects of influenza. Participants were given updates on influenza virus and the scenario of global, regional and national influenza. Shortly after that, the actual operational aspects on influenza surveillance in Bhutan were started with detailed explanation of the roles and responsibilities of each participant and case definition for ILI.

Day 2 (24th December, 2019)

On the second day of the training, the participants were taken through detailed exercise on how to fill up various forms pertaining to ILI surveillance. It consisted firstly a presentation on the rationale of each form, followed by a case scenario on which to fill up appropriate forms. Also, exercises on how to do the weekly reporting through web-based system and SMS were taught. The topics generated many discussions and participants came out with various suggestions for solutions based on their experience in their respective sites.

Day 3 (25th December, 2019)

A presentation was made on clinical case management of influenza by one of the participants in order to refresh the participants, mainly the clinicians. This was then

followed by continuation of the ILI surveillance operational aspects. Participants were made to discuss in their own groups as to how they will make the surveillance work in their respective sites, who will and how they will identify and enroll cases, and also how they will ensure that adequate samples are collected from their sites. These discussions were presented to the forum by representatives from individual sites.

Workshop on Strengthening Human Influenza Surveillance 23rd -25th December 2019, Bumthang, Bhutan

2. Visit the field units in the region to evaluate the SARI & ILI Influenza surveillance projects progress and give staffs the technical guidance.

Due to Influenza surveillance projects takes long period for data collection. So to ensure that routinely assess at the sentinel site whether it is functioning efficiently and providing quality data to meet its objectives. As well as allow the health workers given the opportunity to express problems faced in their respective sites for discussion. So I participated with VML staffs to conduct monitoring and evaluation (M&E) for Influenza surveillance at Phunakha and Trongsa hospital.

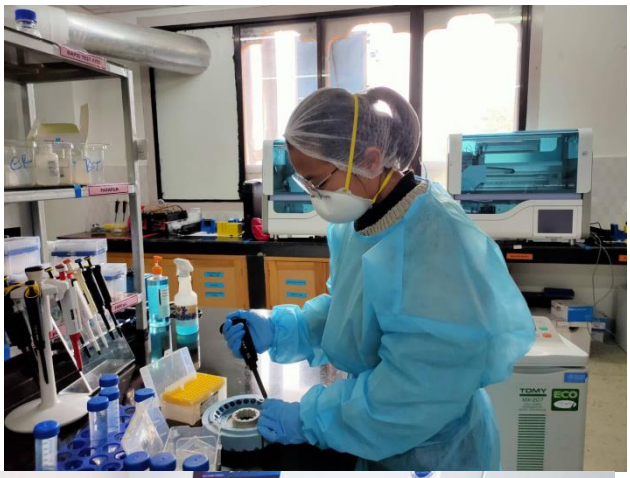
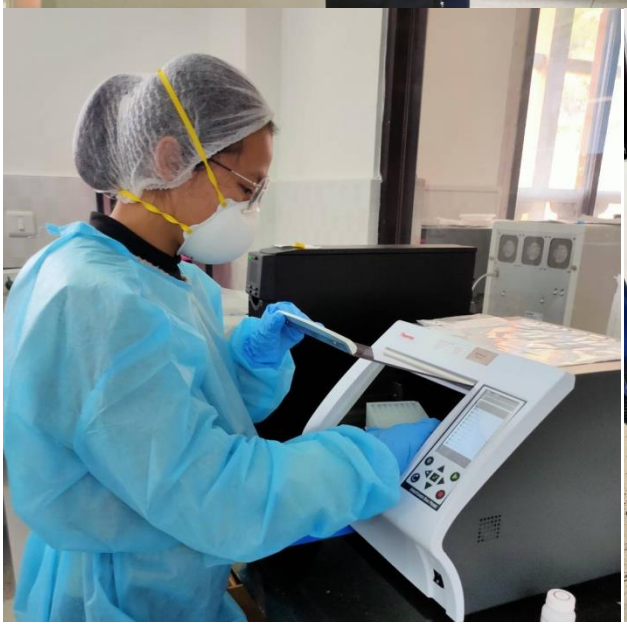
On 11st November 2019 and 25th December 2019, Visit Phunakha hospital and Trongsa hospital for Influenza surveillance M&E

3. Support laboratory in Molecular RT-PCR testing and Characterization for influenza virus

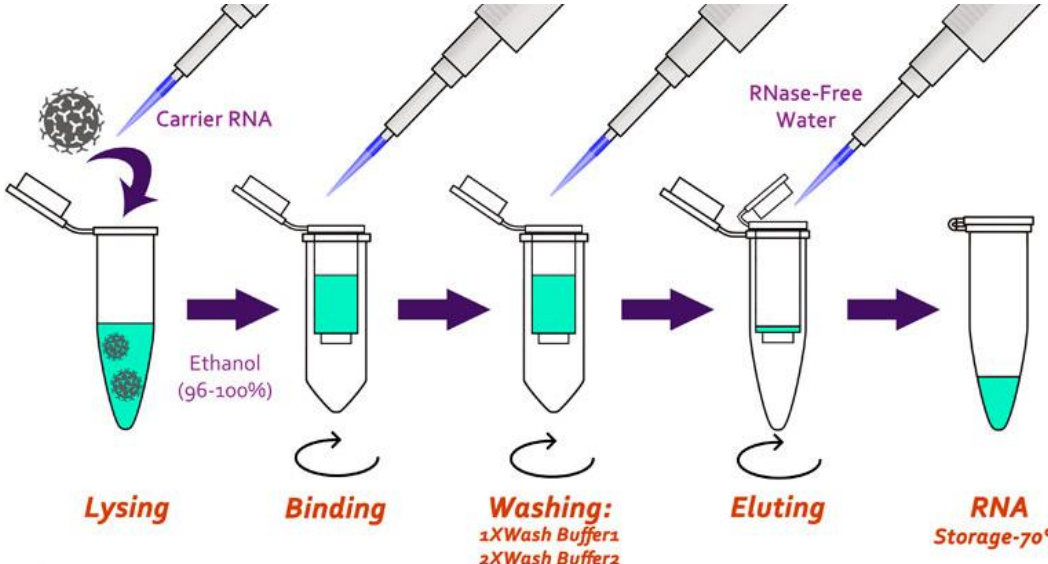
The respiratory specimens which collected from identified patients at the sentinel will be shipped to RCDC within 3 days after collection. After sample receiving, RCDC (virology & molecular LAB) will perform molecular detection and characterization of Influenza viruses by real-time RT-PCR by following processes

1. Data Entry (Information about specimen, patient general information, hospitalization, symptoms and treatments)
2. Sample processing
3. Perform RNA Extraction
4. Perform RT-PCR
5. Post PCR analysis
6. Specimens positive for Influenza A (FluA) were further test for Flu A subtypes, others positive for Influenza B (Flu B) were test for Flu B lineage
7. Results review and data recording into the data base system

From October 2019 to February 2020 VML received suspected Influenza samples from the sentinel sites Average 100-200 samples per week from total 11 sentinel sites. And have done total Volunteer attained the test for 5 months then the Influenza surveillance had to be suspended till the present according to COVID-19 pandemic.


Molecular detection and Characterization for Influenza samples



Objective 2

5S implementation in the laboratory

- **Activities & Achievement**

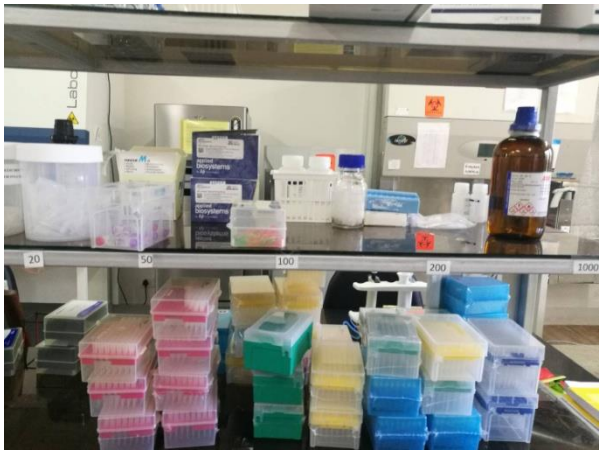
5S is a strategy for organizing spaces so work can be performed efficiently, effectively, and safely. This system focuses on putting everything where it belongs and keeping the workplace clean, which makes it easier for people to do their jobs without wasting time or risking injury. 5S including, Sort, Set in Order, Shine, Standardize and Sustain

Even Royal Center for Disease Control, Thimphu was established since 4 years earlier (in 2016), Infrastructures were settled down and facilities were provided sufficiently year by year. In November, 2019 the Ministry of Health encouraged all divisions to implement 5S in each sections for improving the environment and good practices in the working areas. Regard to I used to work at the professional company in Thailand and they has good practices for 5S, so I tried to apply my experience about 5S system to support this campaign.

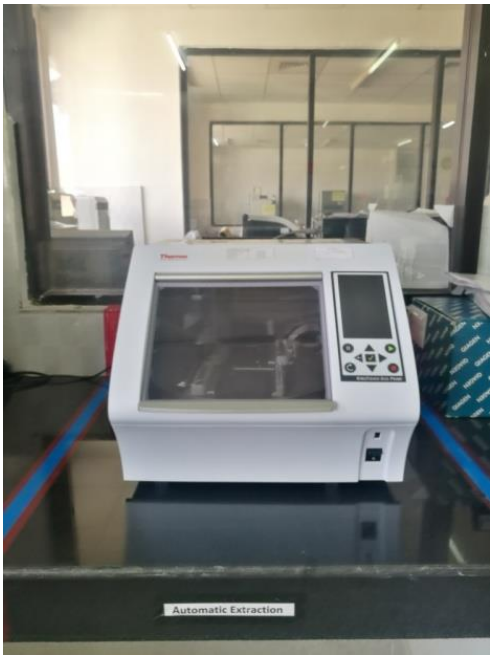
Volunteer & Lab staffs performed 5S following below steps

1. Sorted what needs to be present and what can be removed in each working unit to take up working space as well as put unused items into storage room.
2. Set remained items in the LAB give label, mark area to set those items into order.






Before 5S implementation in VML LAB



After 5S implementation in VML LAB

Objective 3

Implementation of Inventory Management for Chemical, Reagent and Equipment in the laboratory

1. Implement Chemical, Reagent & Consumable Inventory for VML store

Virology & Molecular laboratory LAB, RCDC has responsibilities not only monitor & surveillance about Influenza viruses but also we have capacities to conduct laboratory service and for others respiratory viruses following lists

- hMPV (Human metapneumovirus)
- RSV (Respiratory Syncytial Virus)
- Adenovirus
- Parainfluenzavirus 1 to 3
- Dengue virus 1 to 4
- Measles & Rubella virus
- MERs-Cov
- Zika virus
- Nipha virus
- KFD (Kyasanur forest disease)

For this reason, more than 300 lists of chemicals and reagent are available in the laboratory and used in routine testing. Laboratory has been fund in Influenza surveillance project mostly by US CDC and WHO, so chemical; reagent, consumable and equipment were continuously supplied by these organizations. By the ways, without monitoring and maintaining, many reagents have been expired but records are not available. According to

lab staffs had lack of inventory management experience, so volunteer had been developed inventory for chemical, reagent and equipment to maintain in-coming and maintain all details in VML stock and applied to use in daily basis as well as trained staffs how to manage chemical, reagent and equipment especially First-in, First out (FIFO) principle by following steps.

1. Surveyed and made lists of all chemical, reagent, consumable and equipment which available in VML
2. Created chemicals and reagents inventory as well as equipment inventory
3. Start updating monthly stock for chemicals and reagents inventory as well as keep recording in-coming for new stocks
4. Implement to use chemicals and reagents inventory management by training to LAB staffs how to manage the stocks.

Important lists in chemical, reagent and consumables have to be recorded

- Chemical, reagent and consumables name lists
- Lot number
- Catalog number (if any)
- Receive Date
- Expire Date
- Quantity received
- Storage area

Achievement & Advantage after maintain the inventory

After implementation of chemical, reagent and consumables in December 2019, volunteer had trained VML staffs how to maintain inventory system and good practices.

All in-coming reagents have been recording as well as FIFO system was applied to use in the store management. Lead to less expired and discarded items from store than usual. Future more, chemical, reagent and consumableswere arranged in categories for easier management, and also conveniently for monthly record and update. Not only easy to update the inventory stock but also updating and reporting can be done anytime if needed.

Inventories in VML store were categorized properly

STOCK CARD

VML Reagent & Chemical Inventory

SN	Categories	FOR FLU	List	Lot	Catalog No.or REF No.	Manufacturer	Received date	Received By	Expired Date	Quantity	Unit	Contain siz
67	Consumable	No	Ethanol (WHO) - FINISHED IN VML STORE				15/08/20	BT		10	bt	2.5 litr/bt
68	Consumable	No	Eppendorf 1.5 ml (WHO) - FINISHED							45000	tubes	500 tubes/p
69	Consumable	No	Eppendorf 1.5 ml (TARSON)	D-06-100619			28/08/2020	BT	PD 06/2019	68	box	(500 pcs/bo
70	Consumable	Yes	MicroAmp Optical 8-Tube Strip (0.2ml) - FINISHED	4316567	4316567	ThermoScientific	28/08/2020	BT		10	box	10plate/bo
71	Consumable	No	96 well Reaction plate with barcode (0.1ml) - applied Biosystem	4346907			28/08/2020	BT		50	box	10plate/bo
72	Consumable	No	MicroAmp Fast Reaction Tube (8-Tubes/Strip)	4358293			28/08/2020	BT		78	box	125pcs/bo
73	Consumable	No	Quick-RNA Viral Kit (Zymo) 2nd batch	ZRC205736			Aug-20	BT	NA	160	Box	total 32000 t
74	Consumable	No	QIAamp Viral RNA Mini Kit (Extraction Kit)	166031474			Aug-20	BT	22/05/2022	7	Box	250 test/bo
75	Consumable	No	WHO Extraction kit				Sep-20	BT		2000	test	
76	Consumable	No	MGI Nucleic Acid Extraction Kit	H0066			Oct-20	BT	21/04/21	1	box	1728 test/b
77	Consumable	No	Indian new extraction kit - GeneOmBio	VNA27052020A-I			Oct-20	BT	Jun-21	10000	test	
78	Consumable	No	MicroAmp Optical 8-Tube Strip (0.2ml) - FINISHED	4316567	4316567		20/10/20	BT	N/A	2	box	10/box
79	Consumable	No	Microcentrifuge tube 1.5 ml (Tarson)	D-06-100619	500010	TARSON	20/10/20	BT	N/A	240	Pkt	500/pkt
80	Consumable	No	MicroAmp Fast Reaction Tube (8-Tubes/Strip)	4358293			20/10/20	BT	N/A	40	Pkt	125/pkt
81	Consumable	No	QIAamp Viral RNA Mini Kit (Extraction Kit)	166018281			22/10/20	BT	23/12/20	10	box	250 test/bo
82	Consumable	No	EX-RNA - MAG Extraction kit (India)	RNA4001			01/11/20	TP	Sep-21	417	box	48 test/bo
83	Consumable	No	Microcentrifuge tube, 2 ml (India)	-			01/11/20	TP	NA	40032	pcs	
84	Consumable	No	High Pure Viral RNA Extraction Kit (Switzerland)	REF11858882001			08/11/20	TP	NA	35	box	100 reaction/
85	Consumable	Yes	UTM with 2 applicators swab	2014250			12/11/20	DW+JIB	30/05/21	250	sets	
86	Consumable	Yes	QuickVue, 25 tests/kit	705470	20183N	QUIDEL	12/11/20	DW+JIB	18/01/22	25	Box	25 tests/bo

SN	Categories	FOR FLU	List	Lot	Catalog No.or REF No.	Manufacturer	Received date	Received By	Expired Date	Quantity	Unit	Contain siz
22	COVID-19	No	nCoV E_Sarbeco_R2	Pack date 03/02/2020	NA	NA	17/02/20	DW	NA	1	tubes	
23	COVID-19	No	nCoV N_Sarbeco_F1	Pack date 03/02/2020	NA	NA	17/02/20	DW	NA	1	tubes	
24	COVID-19	No	nCoV N_Sarbeco_R1	Pack date 03/02/2020	NA	NA	17/02/20	DW	NA	1	tubes	
25	COVID-19	No	RdRP gene kit - 1st batch WHO - FINISHED	48242009	NA	NA	21/02/2020	SG	04/02/2021	10	set	100 reaction/
26	COVID-19	No	E Gene kit - 1st batch WHO - FINISHED	48272005	NA	NA	21/02/2020	SG	06/02/2021	10	set	100 reaction/
27	COVID-19	No	RdRP gene kit - 2nd batch WHO - FINISHED	48242009	NA	NA	11/03/20	SG	04/02/2021	10	set	100 reaction/
28	COVID-19	No	E Gene kit - 2nd batch WHO - FINISHED	48272005	NA	NA	11/03/20	SG	06/02/2021	20	set	100 reaction/
29	COVID-19	No	RdRP gene kit - 3rd batch WHO - FINISHED	48242011	NA	NA	21/03/20	BT	12/02/21	20	set	100 reaction/
30	COVID-19	No	E Gene kit - 3rd batch WHO - FINISHED	48272006	NA	NA	21/03/20	BT	11/02/21	50	set	100 reaction/
31	COVID-19	No	COVID Rapid test kit	COV03-200316	NA	NA	01/04/20	BT	15/03/22	44	box	100 test/bo
32	COVID-19	No	CHINA 1 COVID Probe & Primer kit	2020002	NA	NA	24/04/20	BT	10/09/20	307	Box	96 reaction/b
33	COVID-19	No	SINGAPORE COVID Probe & Primer kit	200401	NA	NA	24/04/20	BT	01/10/2020	53	Box	200 reaction/
34	COVID-19	No	RdRP gene kit - WHO 4th batch	48502001	NA	NA	05/05/2020	BT	03/03/2021	18	pack	100 reaction/
35	COVID-19	No	E Gene kit - WHO 4th batch	48272006	NA	NA	05/05/2020	BT	11/02/21	30	pack	100 reaction/
36	COVID-19	No	INDIAN RNA Extraction kit **N GENE CONTAMINATED	14	NA	NA	05/05/2020	BT	04/2021	100	box	100 test/bo
37	COVID-19	No	INDIAN COVID probe & primer kit	PP00005-C-0420001	NA	NA	05/05/2020	BT	Mar-21	100	box	100 test/bo
38	COVID-19	No	CHINA 2 COVID Probe & Primer kit	2020036	NA	NA	12/05/20	BT	30/09/20	422	box	24 test/box
39	COVID-19	No	CHINA Cap strip 8	6121003	NA	NA	12/05/20	BT	NA	13	box	100 strip/bo
40	COVID-19	No	CHINA swab stick		NA	NA	12/05/20	BT	NA	35	box	300pcs/box
41	COVID-19	No	CHINA VTM	20200324	NA	NA	12/05/20	BT	23/03/21	102	pack	48tubes/pa
42	COVID-19	No	VIETNAM P&P COVID-19 reagent	210520	NA	NA	23/05/20	BT	20/05/2021	1000	test	
43	COVID-19	No	CHINA Sample release reagent for COVID - FINISHED	2020034	NA	NA	12/05/20	BT	27/03/22	209	pack	48test/pac

Chemical, reagent and consumables for VML store, developed by Thai volunteer, December 2019

On job training (OJT) with TandinWangmo (Laboratory Technician) when received new lot of RT-PCR consumables

2. Stock management for COVID-19 testing

Bhutan is also affected by COVID-19 pandemic inevitable since March 2019, as RCDC especially is only one laboratory has capability to detect viral gene by using RT-PCR. So RCDC became National COVID-19 Testing Center. There are more than 300,000 COVID-19 Probe & Primer as well as more than 100 lists of consumables to register and update. Volunteer got assigned to manage COVID-19 reagent store as well as monthly updating to Ministry of Health focal person.

According to Bhutan government received COVID-19 testing chemical and reagents from international organization (WHO, CDC ext.) and other countries via donation as well as some were funded by government budget, it necessary to maintain the chemical and reagent inventory and update current stock to concern person to prevent shortage of supply and also to concern about cost saving from huge number of sample testing during this pandemic.

Moreover, Bhutan has been installed more COVID-19 laboratory testing centerin other districts as mentioned in the previous objective. So, RCDC have to provide consumable, reagent and chemicals to the center as well. For the reason, volunteer has to take in charge to manage the stock and provide the consumable to the districts as well.

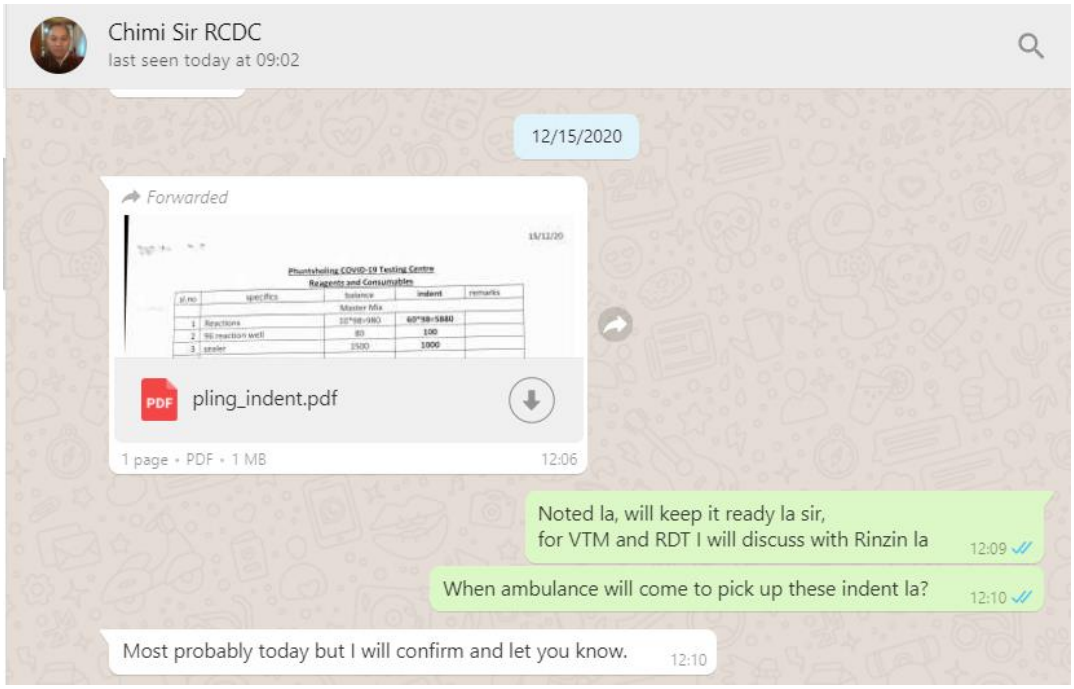
➢ Activities & Achievement

1. Both receiving and issuing reagent and chemical to COVID-19 testing lab were recorded and update by volunteer as well as inventory management in the store

2. Chemical, reagent and consumable for COVID-19 testing were continually update and provided to RCDC and district testing center

3. Volunteer in charge to update and report reagent and inventory for COVID-19 testing to concerned person for example Laboratory chief, RCDC specialist and MoH to follow up usage quantity as monthly report

Reagent, consumables and chemical were provided and were shipped to COVID-19 testing centre in district hospital by volunteer



Phuntsholing COVID-19 Testing Centre

Reagents and Consumables

sl.no	specifics	balance	indent	remarks
	Master Mix			
1	Reactions	10*98=980	**20*98=4900**	
2	96 reaction well	80	**100**	
3	sealer	1500	**0**	
	Extraction			
1	Zymogen	200*10=2000	**200*20=4000**	
2	Eppendorf(1.5ml)	56	**1000*6=6000**	
3	Collection tubes	0	**3000**	
4	Ethanol	500ml*8=4ltrs	**0**	
5	Rnase Free Water	500ml	**1500ml**	
	General Consumables			
1	Pasteur Pippete	0	**5000nos**	
2	Gloves(powder free-6.5)	0	**2500nos**	
3	Pipette tip (10Ul)	100*19=1900	**100*50=4000**	
4	Pipette tip (20Ul)	100*30=3000	**0**	
5	Pipette tip (50Ul)	100*10=1000	**100*10=1000**	
6	Pipette tip (100Ul)	100*40=4000	**0**	
7	Pipette tip (200Ul)	100*30=3000	**100*15=1500**	
8	Pipette tip (1000Ul)	100*20=2000	**100*50=4000**	
9	red biohazard bag (small)	70nos	**300nos**	
10	N95 masks	20pcs	**100pcs**	
11	surgical masks	100pcs	**300pcs**	
12	Vtm	2500nos	**3000nos**	
13	shoe cover	100pairs	**300pairs**	
	Rapid Diagnostic Kits			
1	Antigen test kit (IFA 200)	565	**5000**	
2	Antibody test Kit	1025	**3000**	

Sonam wangchuk
(Sr. Lab Officer)
Phuntsholing General Hospital

Example of required indent to be issue to COVID-19 testing in district hospital

COVID-19 Probe & Primer Reagent					
Sources	Quantity received (test)	Current stock (Test)	Lot Number	Expire Date	Remark
1. AFRIMS Thailand	1,000	1,000	Pack date 03/02/2020	NA	
2. CHINA (1)	29,472	480	2020002	10/09/2020	Expired
3. CHINA (2)	10,128	0	2020036	30/09/2020	Finished
4. India (MyLab)	10,000	10,000	PP00005-C-0420001	01/03/2021	
5. Vietnam	1,000	1,000	210520	21/05/2021	
6. Singapore (Fortitude)	10,600	10,600	200401	01/10/2020	Expired
7. South Korea (Biosensor)	18,048	0	MNCO0120011	29/04/2021	Finished
8. WHO (E assay)	10,560	0	48272005	11/02/2021	Finished
			48272006	06/02/2021	
9. WHO (RdRp assay)	4,608	0	48242009	04/02/2021	
			48242011	12/02/2021	
10.Thermoscientific (TaqPath 1-Step	1,000	900	00912810	30/04/2024	
11.India (2nd batch) (MyLab)	20,000	20,000	PP00005-C-0720007	01/06/2021	
12. Thai (DMSc)	10,000	9,800	08169	03-2022	
13.Biosensor	50,000	0	MNCO0120026	17/08/2021	Finished
14. WHO (E assay)	1,824	1,824	48712028	30/06/2021	
15.TaqPath 1-Step Multiplex Master Mix	4,000	4,000	2226312	30/04/2021	
16. WHO (E assay)	9,600	9,600	48492014	13/04/2021	
17. WHO (RdRp assay)	1,728	1,728	48272024	11/04/2021	
18. BGI RT-PCR kit	3,000	0	6220200779	23/01/21	Finished
19.PerkinElmer (India)	20,016	20,016	D11471	28/04/21	
20.E Assay (Switzerland)	3,552	3,552	48802007	03/09/21	
21.RdRp Assay (Switzerland)	1,728	1,728	48492038	24/09/21	
22. South Korea (Biosensor)	100,000	15,360	MNC0120034	22/09/22	
23. Q-line Molecular (India)	27,000	27,000	M201221	01/11/21	New Received
Total received		**348,864**			
Total test in current stock in RCDC		**138,588**			

Stock card for COVID-19 Prob & Primer, Developed and maintained by volunteer

Extraction kit					
No.	Item	Lot No.	Expired date	Current stock (test)	Remark
1	Quick-RNA Viral Kit (Zymo)	ZRC205718	N/A	1,000	
2	Thermoscientific Extraction kit (UNICEF)	2004028	2021	1,000	
3	QIAamp Viral RNA Mini Kit (Extraction Kit)	166031474	22/05/2022	750	
4	WHO extraction kit		N/A	2,000	
5	Viral RNA/DNA Mini Kit (Extraction kit) - Purelink	2226229	import- May2020	5,150	
6	INDIAN RNA Extraction kit (Old lot)	14	04/2021	9,100	N GENE conteminated
7	Vietnam Extraction kit	200420	19/04/2021	1,000	
8	Biosensor Extraction kit	2005F	May-22	27,100	
9	MGI Nucleic Acid Extraction Kit	H0066	21/04/21	1,728	
10	Indian new extraction kit - GeneOmBio	VNA27052020A-I	Jun-21	10,000	
11	EX-RNA - MAG (India)	RNA4001	Sep-21	20,016	
12	High Pure Viral RNA Kit (Switzerland)	REF11858882001	NA	3,500	
13	Kingfisher auto extraction set	-	Oct-21	0	No Tip Comb
14	Pathkits (MDS Viral RNA Extraction Kit)	RNA/11/20-02	Dec-21	33,600	
15	Biosensor Extraction kit	2009017	01/08/2022	57,600	new received
Total				173,544	

Stock card for COVID-19 extraction kit, developed and maintained by volunteer

COVID-19 Probe & Primer Reagent กล่องจดหมาย ×

มัชฌิมาพร ส่องแสง <songsang.mcp@gmail.com>
ถึง tandindendup, Binay, Sonam, Sonam, Kunzang

Dear Sir,

As you requested a current stock update of COVID-19 Probe & Primer Reagent in RC

COVID-19 Probe & Primer Reagent		
Sources	**Quantity received (test)**	**Current stock (Test)**
1. AFRIMS Thailand	1,000	1,000
2. CHINA (1)	29,472	19,680
3. CHINA (2)	10,128	9,768
4. India	10,000	10,000
5. Vietnam	1,000	1,000
6. Singapore	5,088	5,088
7. South Korea	18,048	18,048
8. WHO (E assay)	10,560	4,704
9. WHO (RdRp assay)	4,608	2,400
Total received		**89,904**
Total test in current stock in RCDC		**71,688**

COVID-19 stock update

Mashchimaporn Songsang <songsang.mcp@gmail.com> 24
ถึง Sonam, Binay

Dear Sonam sir,

Please find COV

จาก: **Mashchimaporn Songsang** <songsang.mcp@gmail.com>
ถึง: Sonam Wangchuk <swangchuk@health.gov.bt>
สำเนา: Binay Thapa <bthapa@health.gov.bt>
วันที่: 24 ก.พ. 2021 20:35
เรื่อง: COVID-19 stock update
ส่งโดย: gmail.com

Sources			
1. AFRIMS Thailand			Pack
2. CHINA (1)			
3. CHINA (2)			
4. India (MyLab)	10,000	10,000	PPO
5. Vietnam	1,000	1,000	
6. Singapore (Fortitude)	10,600	10,600	
7. South Korea (Biosensor)	18,048	0	N
8. WHO (E assay)	10,560	0	
9. WHO (RdRp assay)	4,608	0	
10.Thermoscientific (TaqPath 1-Step	1,000	900	
11.India (2nd batch) (MyLab)	20,000	20,000	PPO
12. Thai (DMSc)	10,000	9,800	
13.Biosensor	50,000	0	N

COVID-19 monthly stock updating to focal person

3. Registration and inventory implementation of laboratory equipment

Making an overview of which equipment is present in the laboratory is the first step in implementing a quality management system for equipment. The equipment register contains specific details about each piece of equipment (such as maintenance and calibration dates, maintenance frequency, which is responsible for the equipment, etc.). Hence, the equipment register is the most important element in managing the quality of equipment.

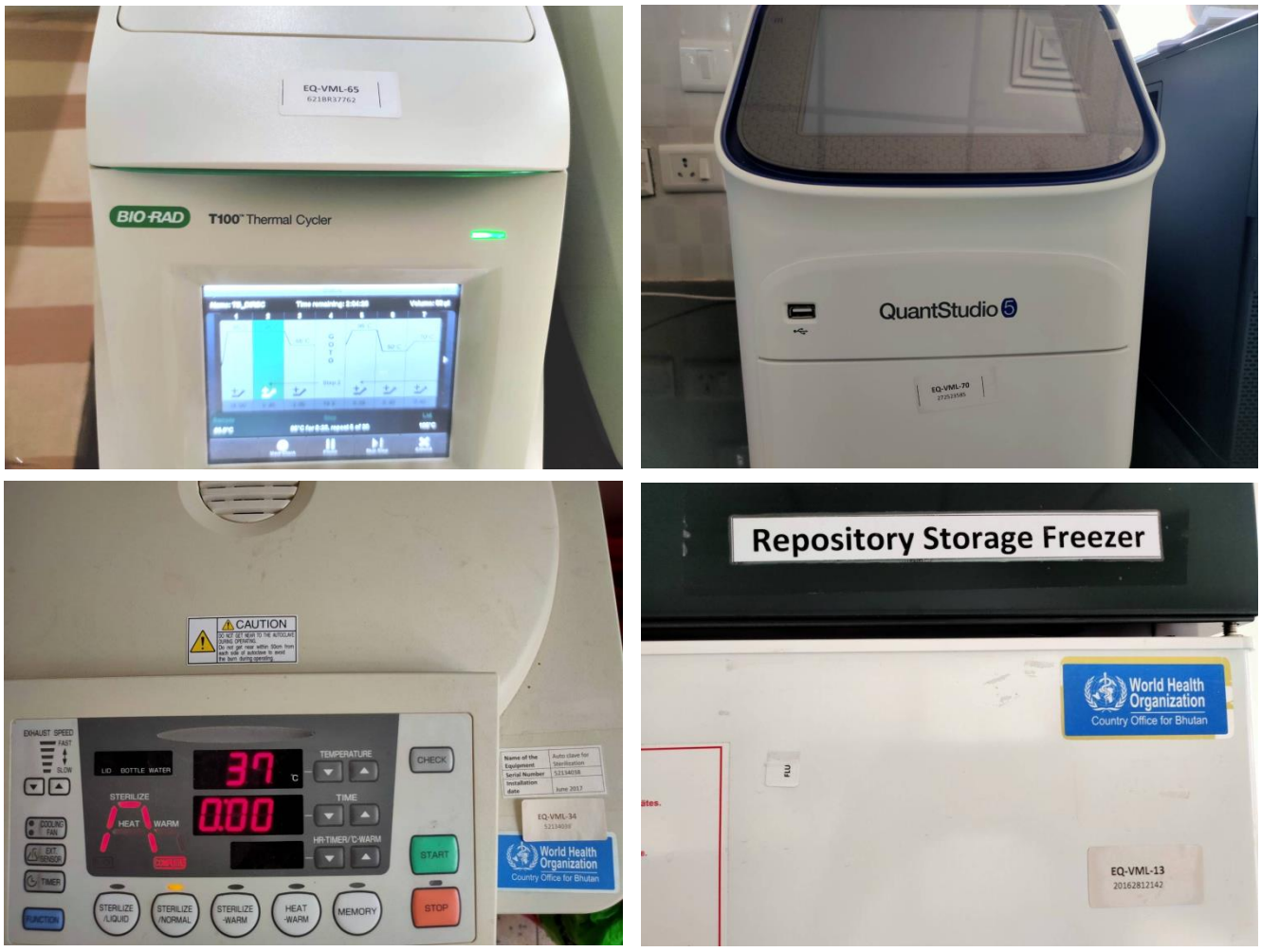
When the equipment register is made directly check the functioning of each piece of equipment and record this in the equipment register so that it is clear which pieces of equipment have priority in planning for maintenance and calibration

VML works on viral molecular testing, most of equipment and machine are high-EN technology to be used in DNA/RNA extraction as well as gene detection. For this reason, a machine cost more than 0.5-1 million THB. Moreover, sample processing in laboratory included many steps and many equipments and machine have to be involved, if those equipment and machine are not be maintained properly this may caused error in the testing result inevitably.

So, Equipment registration is the first step to check proper function of laboratory equipment as well as first step for monitor working efficiency of equipment and machine in the laboratory. Volunteer started survey and registered equipments by maintaining the equipment lists and recording following details

1. Identity
2. Label
3. Serial number
4. Manufacturer name
5. Manufacturer's contact person and contact details
6. Date of purchasing

7. Date of putting into service
8. Location
9. Condition
10. Service provider name
11. Service provider's contact person and contact details
12. Frequency of maintenance
13. Date of previous maintenance
14. Date of next scheduled maintenance
15. Remarks



Equipment identification and labelling before registration

List of Equipment in Virology & Molecular laboratory

1. PCR cabinet
2. Biosafety cabinet class II
3. Automated Extraction Platform
4. Refrigerator
5. Water bath
6. Plate Centrifuge
7. Microcentrifuge
8. Vortex Mixer
9. Refrigerated microcentrifuge
10. Pipette
11. RT-PCR machine
12. Electronic Weighing balance
13. Deep freezer
14. Autoclave
15. Inverted Microscope
16. Fluorescence microscope
17. CO2 incubator

VML_EQUIPMENT DETAILS

List of FUNCTIONING and	Enter number	Quantity norms	Average Price (US $)	Working condition**	Sharing with other labs (Y/N)	Model No.	Serial No.	Year of installation	Manufacturer	Source of funding
Egg incubator	2	2	4400	1	2			2016%		US CDC
CO2 incubator	2	2	20427	1	2			2017%	Memmert	US CDC
Incubator	2	2	2900	1	2				Memmert	US CDC
Microscope	0	0			2					
Inverted microscope	2	2	14000	1	2			2016%	Ziess,	US CDC
Fluorescence microscope	1	1	16000	1	2				Nikon	US CDC
Biosafety cabinet class II	6	6	13595	1	2			2016%	Nuaire-3, Esco-3	US CDC/WHO
Autoclave	2	2	7773	1	1			2016%	Tomy, Biobase	US CDC/WHO
Water bath (37°C)	0	0			2					
Water bath (56°C)	1	1		1	2			2016%	Memmert	US CDC
Refrigerated centrifuge	1	1	12588	1	2			2015%		US CDC

Egg incubator	2	2	4400	1	2			2016%		US CDC	N	main store	
CO2 incubator	2	2	20427	1	2			2017%	Memmert	US CDC		main store	
Incubator	2	2	2900	1	2				Memmert	US CDC		culture room	
Microscope	0	0			2								
Inverted microscope	2	2	14000	1	2			2016%	Ziess,	US CDC		culture room	
Fluorescence microscope	1	1	16000	1	2				Nikon	US CDC		culture room	
Biosafety cabinet class II	6	6	13595	1	2			2016%	Nuaire-3, Esco-3	US CDC/WHO			
Autoclave	2	2	7773	1	1			2016%	Tomy, Biobase	US CDC/WHO			
Water bath (37°C)	0	0			2								
Water bath (56°C)	1	1		1	2			2016%	Memmert	US CDC			
Refrigerated centrifuge	1	1	12588	1	2			2015%		US CDC			
Refrigerator	5	5	2900	1	2			2015%	Samsung, Whirlpool	US CDC/WHO			
Freezer -20°C	4	4	3335	1	2			2015%		US CDC			
Thermal cycler (Thermocycler, PCR Machine or DNA Amplifier), Conventional	1	1	4800	1	2			2015%	Biorad	US CDC/WHO			

Equipment list record before new development: only 30% of all equipment was record and important details wasn't provided

Virology and Molecular Laboratory, RCDC
Equipment List

VML Equipment Code	Equipment name	Installation date/Year	Equipment Model	Serial number (SN)	Equipment status	Manufacturer	Source of funding
EQ-VML-01	Biosafety cabinet class II B1	40498	NU-427-400E	136165030310	Working	NuAir	US CDC
EQ-VML-02	Biosafety cabinet class II A2	25/05/2016	LA2-4A1-E	2016-115450	Working	ESCO	US CDC
EQ-VML-03	Automated Extraction Platform (Kingfisher DuoPrime)	31/07/2019	5400110	70680110	Working	Thermo Scientific	US CDC
EQ-VML-04	Refrigerator whirpool (2-8°C)	01/01/2017	20150	INE17411304	Working	Whirlpool	US CDC/WHO
EQ-VML-05	Refrigerator SAMSUNG (2-8°C)	01/01/2015	RT26H3000SE/TL		Working	Samsung	US CDC/WHO
EQ-VML-07	Water bath (56°C)	14/09/2016	W-350	881102	Working	MEMMERT	US CDC
EQ-VML-08	Plate Centrifuge	01/01/2017	LMC-3000	1.02082E+12	Working	BIOSAN	US CDC
EQ-VML-10	Microcentrifuge (Hanglab)	40461	Microcen16	00042116000	Working	Hanglab	RGoB

VML Equipment Code	Equipment name	Installation date/Year	Equipment Model	Serial number (SN)	Equipment status	Manufacturer	Source of funding
EQ-VML-13	Ultra low freezer (-80°C) moved from extraction room	01/01/2017	VTS258	20162812142	Working	-	
EQ-VML-40	Refrigerator whirpool (2-8°C)	01/01/2017	20150	INE174113015	Working	Whirlpool	US CDC/WHO
EQ-VML-41	Biosafety cabinet class II A2-1	01/01/2017	LA2-4A1-E	2016-112671	Working	ESCO	US CDC
EQ-VML-42	Biosafety cabinet class II A2-2	01/01/2017	LA2-4A1-E	2016-109310	Working	ESCO	US CDC
EQ-VML-43	Inverted Microscope	01/01/2017	RIC-551D-FLURO	217104	Working	Ziess	US CDC
EQ-VML-44	Refrigerated centrifuge	41192	5810R	5811BM567216	Working	Eppendorf	US CDC
EQ-VML-46	Water bath (37°C)	22/01/2018	RIC-WB	217103	Working		
EQ-VML-47	CO2 incubator- (cell culture)	2017	INCO246med	FNr03150119	Working	Memmert	US CDC
EQ-VML-74	Refrigerator (VESTFROST)(5-43°C)	09/2020	VLS064ARFAC	20193522886	Working	VESTFROST	RGoB
EQ-VML-75	Refrigerator (VESTFROST)(5-43°C)	09/2020	VLS064ARFAC	20193522883	Working	VESTFROST	RGoB
EQ-VML-48	CO2 incubator- (cell culture)		HCP246	FNrH314-0037	Working	Memmert	US CDC
EQ-VML-49	Refrigerator whirpool (2-8°C)	01/01/2017	20150	INE174113206	Working	Samsung	US CDC/WHO
EQ-VML-52	Inverted Microscope	01/01/2015	Primovert	1777-614	Working	Ziess	US CDC
EQ-VML-53	Fluorescence microscope	01/01/2015			Working	Nikon	US CDC/WHO
EQ-VML-54	Biosafety Cabinet-1	01/01/2017	NU-427-400E	166297120914	Working	NuAir	US CDC/WHO

Volunteer have developed and implemented equipment inventory for VML

Objective 4

Implementation of internal equipment calibration

Calibration defines the accuracy and quality of measurements recorded using a piece of equipment. Over time there is a tendency for results and accuracy to 'drift' when using particular technologies or measuring particular parameters such as temperature and humidity. To be confident in the results being measured, there is an ongoing need to maintain the calibration of equipment throughout its lifetime for reliable, accurate and repeatable measurements. Therefore, Implementation of internal calibration is necessary.

There are more than 70 laboratory equipments for example Biosafety cabinet class II, water bath, CO_2 incubator and electronic weighing balance. Some specific equipment had yearly calibration plan by using outsource services such as Automated Extraction Platform and ABI 7500 Dx Real Time PCR equipment.

What is Calibration?

Calibration is the act of testing and adjusting the precision and accuracy of an instrument. Research labs use it to ensure correct data.

Calibration compares a standard measurement to the measurement taken by your instrument. While the accuracy of your instrument may not be the same as the standard, there is an acceptable accuracy ratio. Your instrument will need to measure up to the requirements.

Why is Calibration Important?

You need instrumentation calibration in order to reduce the bias in an instrument's readings. Precision and accuracy are both required when collecting data. Precision focuses on the degree to which repeated measurements without change to the conditions will show the same result. Accuracy is the degree of closeness of measurement of a quantity to its actual value.

Maintenance of Instruments

All of the instruments in your lab require different maintenance and calibration standards. How often depends on how much you use it and how quickly it degrades. Manufacturers have recommendations and certifications have set requirements. Some of them will need monthly while others are yearly.

They may do some in the lab while others require off-site calibration. You will need to get your instruments calibrated by experts. An ISO:17025 accredited calibration lab will meet such requirements.

ISO 17025 Accredited Calibration Services

Equipment calibration is critical to a lab to maintain in order to get the most accurate and precise data. By having your instrumentation maintained with ISO 17025 accredited calibration, you are ensuring that your lab will have the best reputation. You will want to research to find a company that is an accredited company and will be able to coordinate with you on the turnaround time. As your lab's productivity will be compromised when equipment is in transit. Due your due diligence when researching and in the end, your lab equipment will continue to uphold data integrity.

Why Calibration Matters

Why is calibration so important? Let's take a closer look at the importance of calibration.

1. Saves Money

Calibration reduces errors that can get costly in the long run.

Those errors can happen whether your facility is a research lab or a manufacturer or goods. For example, manufacturers who don't calibrate equipment will end up with errors that create unusable parts. Research labs who don't calibrate can end up with meaningless results because they were based on inaccurate measurements.

When you don't calibrate, you'll often have to halt and restart processes when inaccuracies are discovered. The longer it takes for those inaccuracies to get noticed, the more costly the mistake will be. But if you always calibrate, you won't have these problems.

2. Improves Safety

Safety becomes very important in certain labs. You might be working with potentially dangerous materials, or creating solutions for medical purposes. In these cases, small inaccuracies can have large consequences.

Maybe you're measuring electric currents, or mixing volatile chemicals. Small changes to the numbers can quickly put your staff in danger. Calibration allows you to get reliable numbers for improved safety.

3. Gets You Certified

You'll need calibration to get certified in a lot of industries. You might need certification from regulatory bodies in order to do certain tasks, for example.

Even if you don't need certification, calibration is still important for the reliable results it gives. Your reputation for research or results will quickly suffer if you work with equipment that's not calibrated.

4. Keeps Instruments Working Longer

Over time, the accuracy of any measuring device goes down. Some instruments degrade more quickly than others. The environment where you use the equipment can also affect how quickly it degrades.

When you calibrate your equipment, you set it back to the original standard, so you can keep using it. The device that's giving inaccurate readings probably doesn't need to be replaced – it just needs calibration.

VML works on Influenza surveillance as the main current project, which funded by US CDC and WHO, so most of the equipment and the machine are imported from oversea especially Thailand, Singapore and India for Molecular testing. Which means all services as well as equipment calibration have to be done by service engineer from outside. So far, no accreditation services laboratory in Bhutan, every calibration have to be requested from outside the country which takes long process and impossible to request for yearly calibration for 100% of equipment since limitation of budgets. So some equipment can be done by internal calibration by following ISO 17025 Standard till future requirement if laboratory need calibration certificate.

➢ Activities & Achievement

1. Developed SOP for Equipment Calibration

1.1 Check internal standard for internal equipment calibration and applied into laboratory, most of the standard applied from WHO guidelines for laboratory management.

1.2 Made lists of laboratory equipment which can be carried out for internal calibration.

1.3 Develop SOP for internal Equipment Calibration.

1.4 Reviewed and approved SOP by chief of laboratory and RCDC specialist.

1.5 Set up internal calibration plan.

1.6 Implemented internal calibration in VML

1.7 Trained VML focal staffs & demonstrated performing internal calibration.

VIROLOGY AND MOLECULAR LABORATORY

ROYAL CENTRE FOR DISEASE CONTROL

SOP No. RCDC/VML/SOP/26

STANDARD OPERATING PROCEDURE

FOR EQUIPMENT CALIBRATION

Version 01

Date: 30th Nov 2020

Prepared by: Mashchimaporn Songsang, Thai Volunteer, RCDC

Reviewed by: Binay Thapa, Chief Laboratory Officer, RCDC

Approved by: Dr.Sonam Wangchuk, Head, RCDC

Example of SOP for internal calibration by volunteer

9.2 Micro Pipette

- Switch on the weight balance and wait until internal calibration complete.
- Adjust micro pipette volume as desired volume. One test of calibrated volume should be the maximum volume of the pipette and another calibrated volume should be the same as set volume in routine work.
- Place plastic Petri dish on the middle of balance and press "TARE" or "zero".
- Pipette distilled water into the Petri dish plate.
- Record weighed value in calibration record form RCDC/VML/F/04 Rev.01 as per Annexure II
- By using the same Petri dish, press "TARE" or zero and pipette distilled water into the plate. Repeat this step 10 times per one calibrated volume.
- The weighed value should be ≤ 0.1% accuracy limit to the set volume values. Follow how to calculate the accuracy by below table.

$$\text{Accuracy (\%)} = \frac{\text{Set volume(µl) - Average volume(µl)}}{\text{Set volume(µl)}} \times 100$$

Remark: water density = 1 kg/m^3

- When non conforming result occurred, handling following by Annexure VIII.
- Frequency is yearly.

9.3 Electronic Weight Balance

- Prepare reference weight test pieces 0.5 g, 1 g and 5 g and clean properly by gentle wipe by cotton provided by the manufacturer.
- Check the level, and if necessary, level the balance using the leg ferrule adjusters and the in-built spirit level.
- Press the "Start" button. Allow five minutes for the electronics to warm up before calibration.
- Press "TARE" or Zero and ensure that the balance reads 0.0000 +/- 0.0003 g. Place 0.5 g of reference weight test piece on the middle of balance. And record weighed value in calibration record form RCDC/VML/F/05 Rev.01 as per Annexure III. Repeat this step 10 times for another reference weight test piece. (

Example of SOP for internal calibration by volunteer

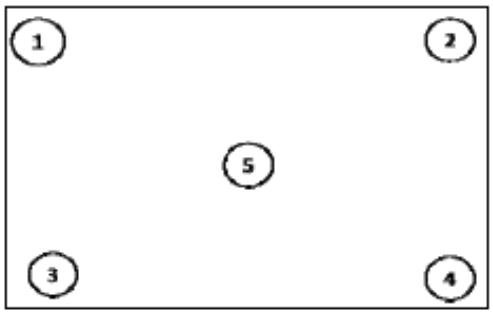
0.5 g, 1 g and 5 g) Accuracy of balance must be ≤ 0.1 % of reference test weight values. Follow how to calculate the accuracy by below table.

$$\text{Accuracy} = \frac{2 \times SD}{\text{The value of reference weight test piece}} \times 100\%$$

- When non conforming result occurred, handling following by Annexure VIII.
- Frequency is yearly.

9.4 Biosafety Cabinet Class II

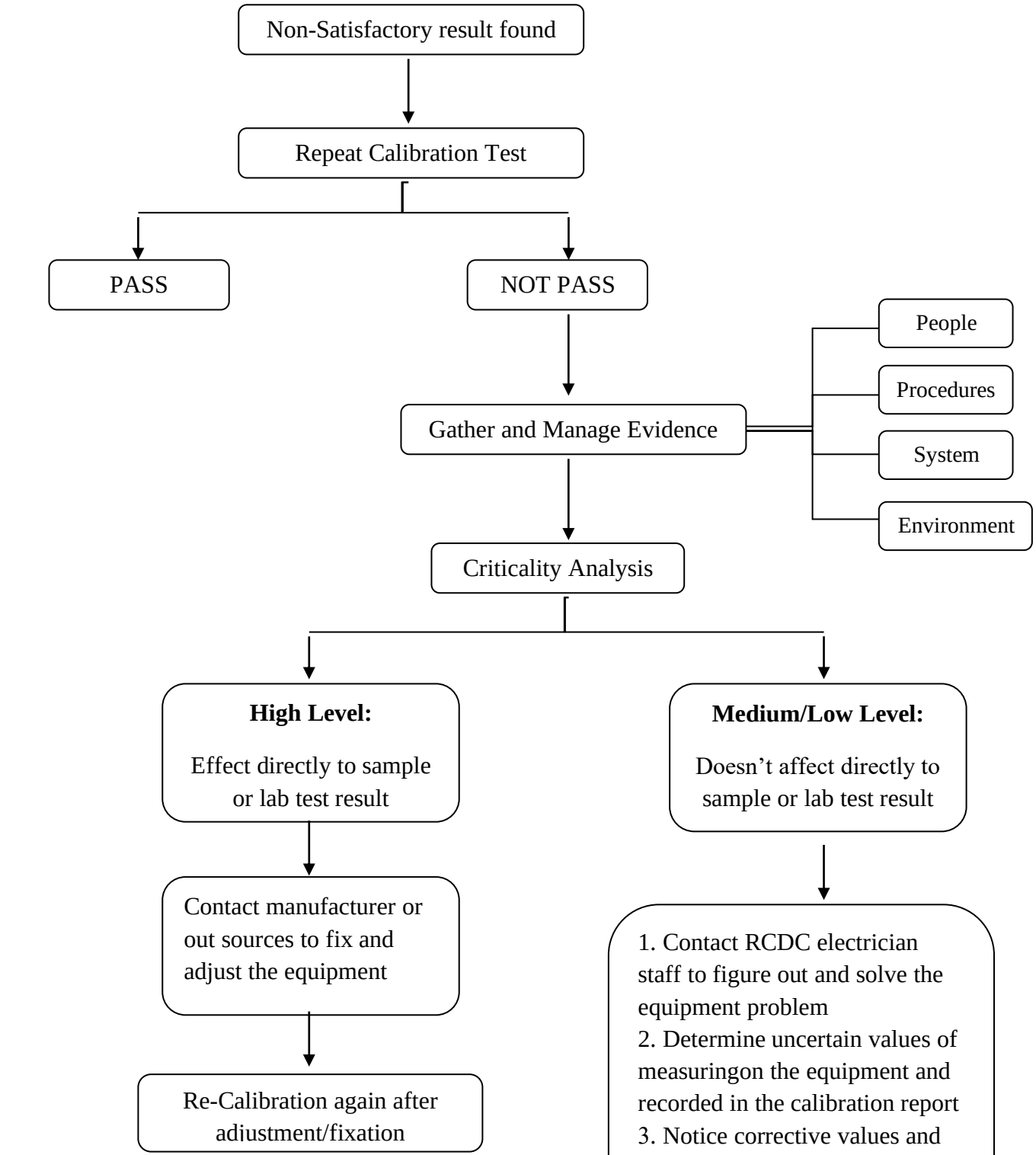
- Switch on the UV lamp and leave for 15 minutes for decontamination.
- After 15 minutes, Lift the glass window up and press "Light" and "Flow" buttons and clean inside the cabinet properly by 70% alcohol. Allow to warm up for 10-15 minutes before start calibration.
- Place and exposure PDA plates in the cabinet for 30 minutes, following the below layout.



- After 30 minutes, place the plate cover and incubate at 30°C for 5 days.
- Observe the bacteria, yeast and mold growth on the agar after incubated at 24 hrs, 3 days and 5 days respectively.
- Record the result in calibration record form RCDC/VML/F/06 Rev.01 as per Annexure IV.
- The microorganism must be not detected on the PDA plate.
- When non conforming result occurred, handling following by Annexure VIII.
- Frequency is yearly.

Example of SOP for internal calibration by volunteer

Non Conforming results management for internal calibration



Example of SOP for internal calibration by volunteer

Yearly Internal Calibration Plan for VMl Equipment 2021													
Equipment Code	**Equipment Name**	**JAN**	**FEB**	**MER**	**APR**	**MAY**	**JUNE**	**JULY**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
EQ-VML-01	Biosafety cabinet class II B1					●							
EQ-VML-02	Biosafety cabinet class II A2					●							
EQ-VML-41	Biosafety cabinet class II A2-1					●							
EQ-VML-42	Biosafety cabinet class II A2-2					●							
EQ-VML-54	Biosafety Cabinet-1					●							
EQ-VML-55	Biosafety Cabinet-2					●							
EQ-VML-07	Water bath (56°C)						●						
EQ-VML-46	Water bath (37°C)						●						
EQ-VML-25	Electronic Weighing balance							●					
EQ-VML-47	CO2 incubator- (cell culture)								●				
EQ-VML-48	CO2 incubator- (cell culture)								●				
EQ-VML-51	Refrigerated microcentrifuge									●			
EQ-VML-85 to 96	Pipette (all in use in Extraction Room)	●											
	Pipette (all in use in Master Mix Room)		●										
	Pipette (all in use in Media Preparation Room)			●									
	Pipette (all in use in Cell culture Room)				●								

* Remark

/ : Completed

● : Plan

Yearly Internal Calibration Plan for VML Equipment 2021

RCDC/VML/F/05 Rev.01 Effective date 30th Nov 2020

CALIBRATION RECORD OF ELECTRONIC WEIGHT BALANCE

Equipment No.	: EQ-VML- 25	Ref. SOP No.	: RCDC/SOP/VML/05 Rev.01
Model No.	: PA 213	Serial No.	: B511717882

Date of Calibration : 11/12/2020
Next Due Date : 11/12/2021
Location : Post PCR Room (VML)
Frequency : Yearly

Test Load (g)	Repeatability No.	Repeatability Indication (g.)	Standard Deviation (SD)	Test By
0.5 g	1	0.499	0.000422	
	2	0.500		
	3	0.500		
	4	0.499		
	5	0.500		
	6	0.500		
	7	0.500		
	8	0.500		
	9	0.500		
	10	0.500		
1 g	1	0.999	0.000316	
	2	0.999		
	3	0.999		
	4	0.998		
	5	0.998		
	6	0.999		
	7	0.999		
	8	0.999		
	9	1.000		
	10	0.999		
5 g	1	4.995	0	
	2	4.995		
	3	4.995		
	4	4.995		
	5	4.995		
	6	4.995		
	7	4.995		
	8	4.995		
	9	4.995		
	10	4.995		

Test load 0.5 g., Repeatability = 0.168 %
Test load 1 g., Repeatability = 0.126 %
Test load 5 g., Repeatability = 3.74×10^{-13} %

→Repeatability ≤ 0.1% of the normal value of test load weight = Pass

☑ The results Satisfactory
☐ The results Not-Satisfactory

$$\text{Repeatability} = \frac{2 \times SD}{\text{The normal value of test load weight}} \times 100$$

Corrective Action & Comment: Repeatability of test load 0.5 g, 1 g and 5 g less than 0.1% of each test load, So result of calibration are passed

Analyst by: _____ **Verify by:** _____
Date: 11/12/2020 **Date:** _____

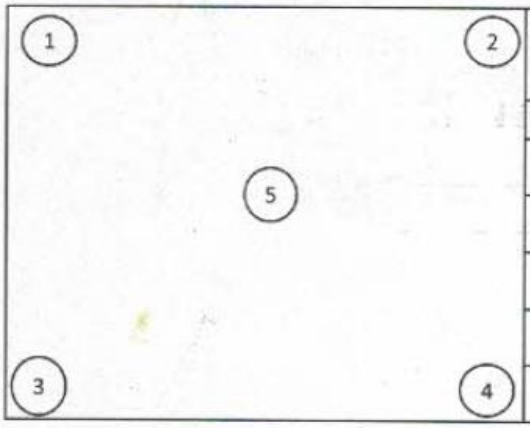
Example of equipment calibration record

CALIBRATION RECORD OF WATER BATH

Equipment No.	: EQ-VML-A6	**Ref. SOP No.**	: ~~217/03~~ RCDC/VML/SOP.05 Rev.
Model No.	: RIC-WB	**Serial No.**	: 217/03

Date of Calibration : 09/12/2020
Next Due Date : 09/12/2021
Location : Media Preparation Room
Frequency : Yearly

Observe Temperature in Water bath



Point & Temperature		Test by
point	temperature	
1	36.5	
2	38.5	
3	38.2	
4	38.8	
5	39.0	

☑ The results Satisfactory

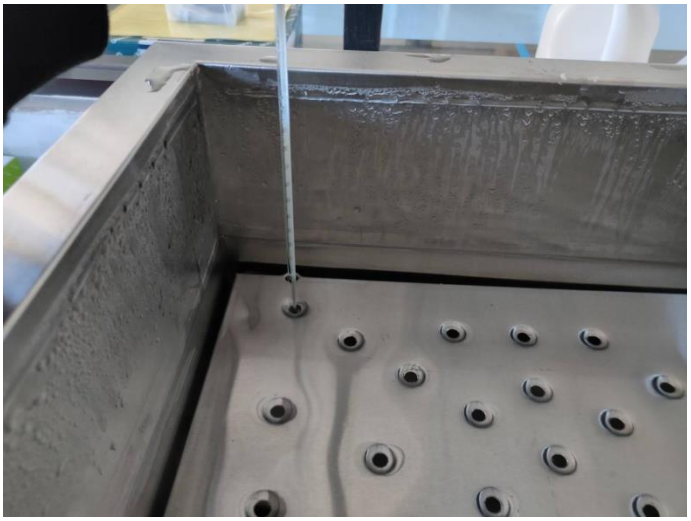
☐ The results Not-Satisfactory

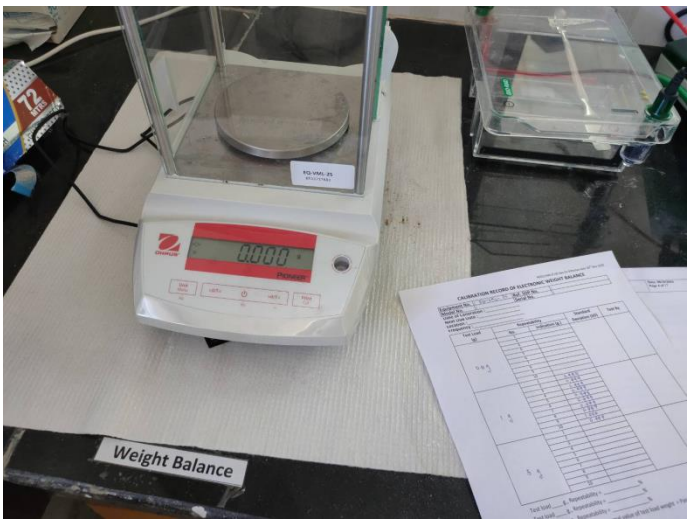
Corrective Action & Comment the water bath was set at 37°C (used temperature for cell culture room), average of calibrated temp. is 38.2°C from 5 calibrated point. that's mean +1.2°C deviation, should set ±1.2 - 1.5°C of desired temperature.

Analyst by:
Date: 09/12/2020

Verify by:
Date:

Example of equipment calibration record





On water bath and weight balance calibration (November 2020)

Objective 5

Implementation of document control and document management

Working in the laboratory is necessary to follow the standard operation procedures (SOP) to help workers carry out complex routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure; many SOPs were developing to be guidelines. Additionally, LAB testing processes and LAB results has been recorded in forms, LOG book and worksheets. So document control systems need to be implemented in the LAB to make the document be set in the order, easy to control and manage as well as preparing for the future ISO standard implementations.

➢ **Activities**

1. Created master list for document control.
2. Made lists of document.
3. Communicate & consult with counterpart to implement the document control system and team agreed with using the system in the LAB.
4. Train VML staffs, especially QMS (Quality Managment System) focal person Mr.Dorji Wangchuk to look after and maintain document control.
5. Applied document control to Influenza project and submit non-conformities comment in Influenza to US-CDC in behalf of National Influenza Center(NIC) audit.

➢ **Achievement**

- Document control was implemented into VML, all document were registered into the master list and controlled of distribution.
- The lab has systematic in document management, document storage and distribution
- Lab has fundamental and good practice in document management, lead to future improvement in quality system

Volunteer joined workshop in National Influenza Center (NIC) non-conformities audit (at Poscatd Dewa Hotel, Thimphu, November 2020), and document control developed by volunteer had been applied into the session

Document Master List for VML Laboratory

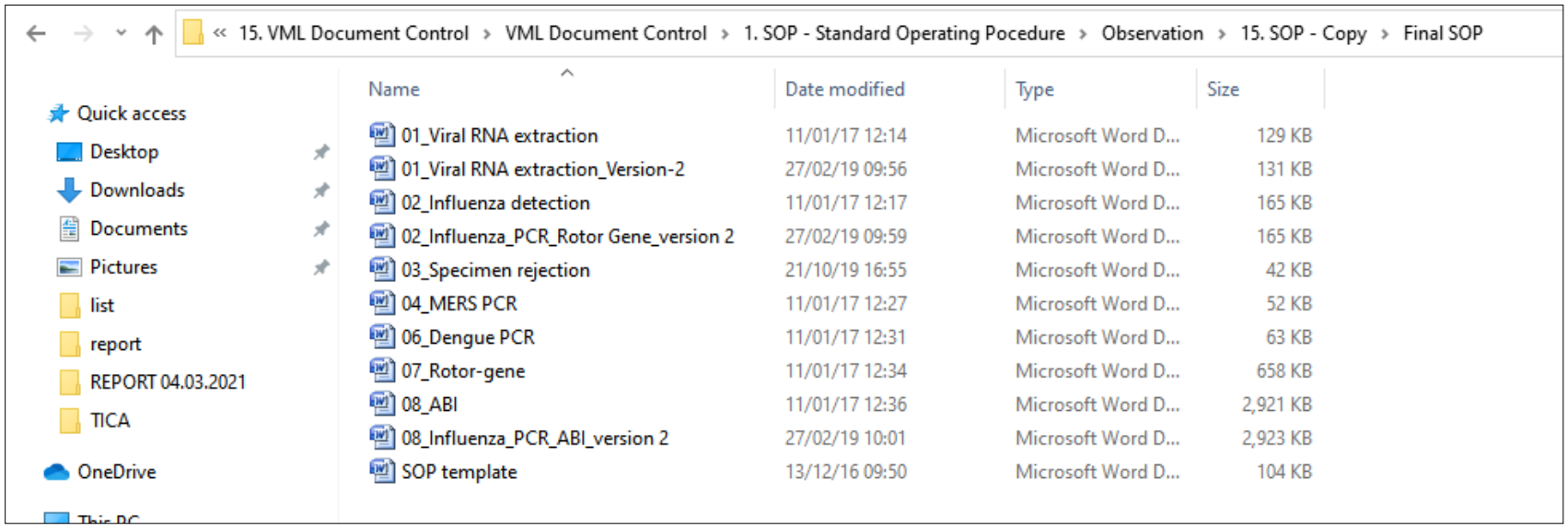
1. Standard Operating Procedures (SOP)

N	Ty	SOP Number	Versio	Document Name	Type	Effective Date	Author	Registered Date	Registered by
1	SOP	RCDC/VML/SOP/01	1	RNA extraction using QIAmp viral RNA mini Kit	Invalid	01/01/17	Sangay Zangmo	21-Nov-20	M.Songsang
2	SOP	RCDC/VML/SOP/02	1	Detection and characterization of Influenza virus	registered	01/01/17	Dorji Wangchuck	21-Nov-20	M.Songsang
3	SOP	RCDC/VML/SOP/03	1	Rejection of Laboratory Specimen for Influenza PCR	registered	01/01/17	Binay Thapa	21-Nov-20	M.Songsang
4	SOP	RCDC/VML/SOP/04	1	MERS CoV PCR using ALTONA kit	registered	01/01/17	Binay Thapa	21-Nov-20	M.Songsang
5	SOP	RCDC/VML/SOP/05	1	Internal Eqipment Calibration	Received	30/11/20	M.Songsang	21-Nov-20	M.Songsang
6	SOP	RCDC/VML/SOP/06	1	Dengue Netsed PCR	Invalid	01/01/17	Sangay Zangmo	21-Nov-20	M.Songsang
7	SOP	RCDC/VML/SOP/07	1	Operation and maintenance of Rotor-Gene™ Real-Time Thermocycler	registered	01/01/17	Sangay Zangmo	21-Nov-20	M.Songsang
8	SOP	RCDC/VML/SOP/08	1	Operation and maintenance of ABI 7500 Fast Dx	registered	01/01/17	Sonam Gyeltshen	21-Nov-20	M.Songsang
9	SOP	RCDC/VML/SOP/06	2	Dengue Netsed PCR	Received	30/11/20	Sangay Zangmo	21-Nov-20	M.Songsang
10	SOP	RCDC/VML/SOP/01	2	RNA extraction using QIAmp viral RNA mini Kit	Received	30/11/20	Dorji Wangchuck	21-Nov-20	M.Songsang
11	SOP	RCDC/VML/SOP/09	1	Emergency duty in Virology and Moleculer laboratory	Received	30/11/20	Binay Thapa	21-Nov-20	M.Songsang
12	SOP	RCDC/VML/SOP/10	1	Respiratory virus isolation	Received	30/11/20	Sangay Zangmo	21-Nov-20	M.Songsang
13	SOP	RCDC/VML/SOP/11	1	Propagation of MDCK cells	Received	30/11/20	Sangay Zangmo	21-Nov-20	M.Songsang
14	SOP	RCDC/VML/SOP/12	1	Preparation of Reagents for virus culture	Received	30/11/20	Sangay Zangmo	21-Nov-20	M.Songsang
15	SOP	RCDC/VML/SOP/13	1	Hemagglutination Inhibition assay	Received	30/11/20	Sangay Zangmo	21-Nov-20	M.Songsang
16	SOP	RCDC/VML/SOP/14	1	Sample Rejection and Acceptance	Received	30/11/20	Kunzang Dorji	21-Nov-20	M.Songsang
17	SOP	RCDC/VML/SOP/15	1	Specimen receiving, verification, processing and rejection	Received	30/11/20	Sangay Zangmo	21-Nov-20	M.Songsang
18	SOP	RCDC/VML/SOP/16	1	Detection of 2019-nCoV by PCR using LightMix Modular SARS-CoV-2(COVID-19) kit	Received	24/11/20	M.Songsang	21-Nov-20	M.Songsang
19	SOP	RCDC/VML/SOP/17	1	Detection of 2019-nCoV by PCR using PerkinElmer® Detection Kit	Received	25/11/20	M.Songsang	21-Nov-20	M.Songsang
20	SOP	RCDC/VML/SOP/18	1	Detection2019-nCoV by PCR using TaqPath™ COVID-19 CE-IVD RT-PCR Kit	Received	26/11/20	M.Songsang	21-Nov-20	M.Songsang

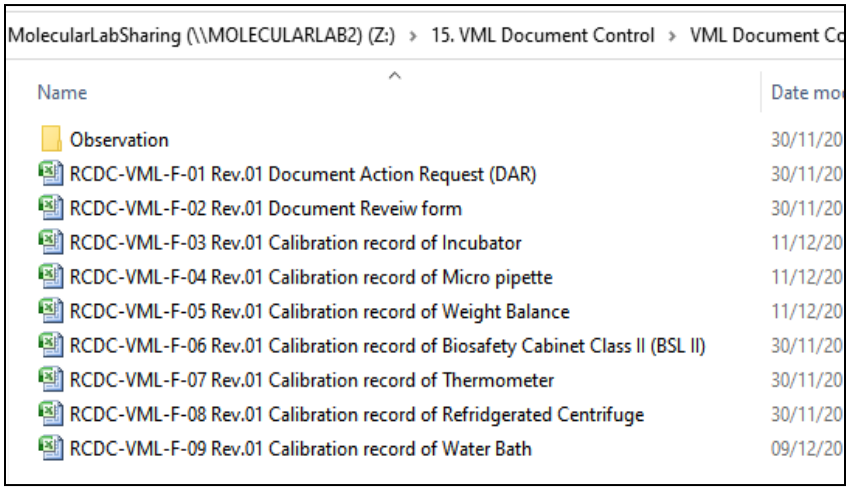
1. Standard Operating Procedures (SOP)

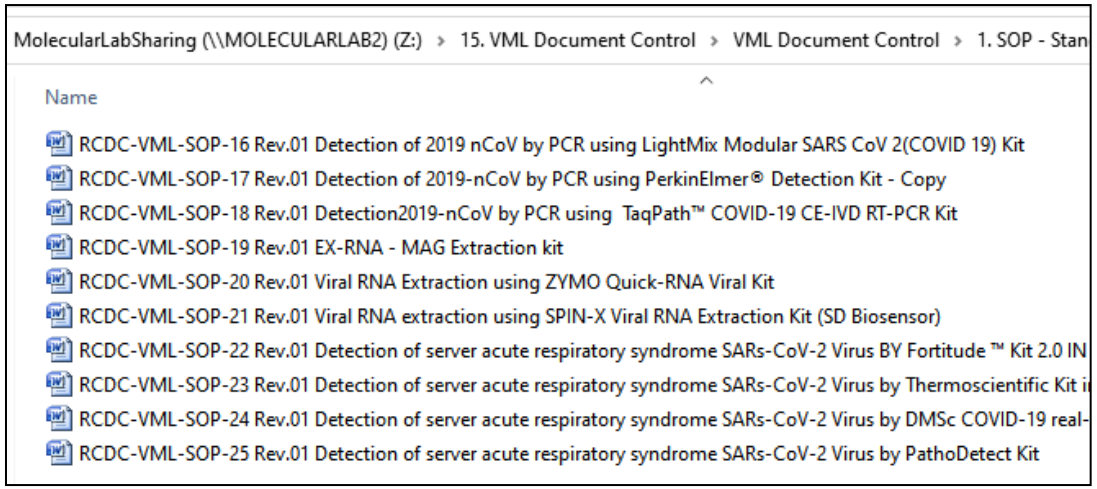
N	Ty	SOP Number	Versio	Document Name	Type	Effective Date	Author	Registered Date	Registered by
	F								
3. Supporting Document (SD) (eqipment manual, reference document, technical guidline)									
1	SD	RCDC/VML/SD/01	1	Instruction and maintenance manual for laboratory equipment in virology and molecular laboratory	Received	30/11/20	Sonam Gyeltshen	21-Nov-20	M.Songsang
	SD								
	SD								
	SD								
	SD								
	SD								
	SD								
4.Log Book (LOG)									

Document control master list is the main control sheet for overall document in VML, was developed and trained to staffs by volunteer



Unsystematic document control and storage **before** implementation of document control





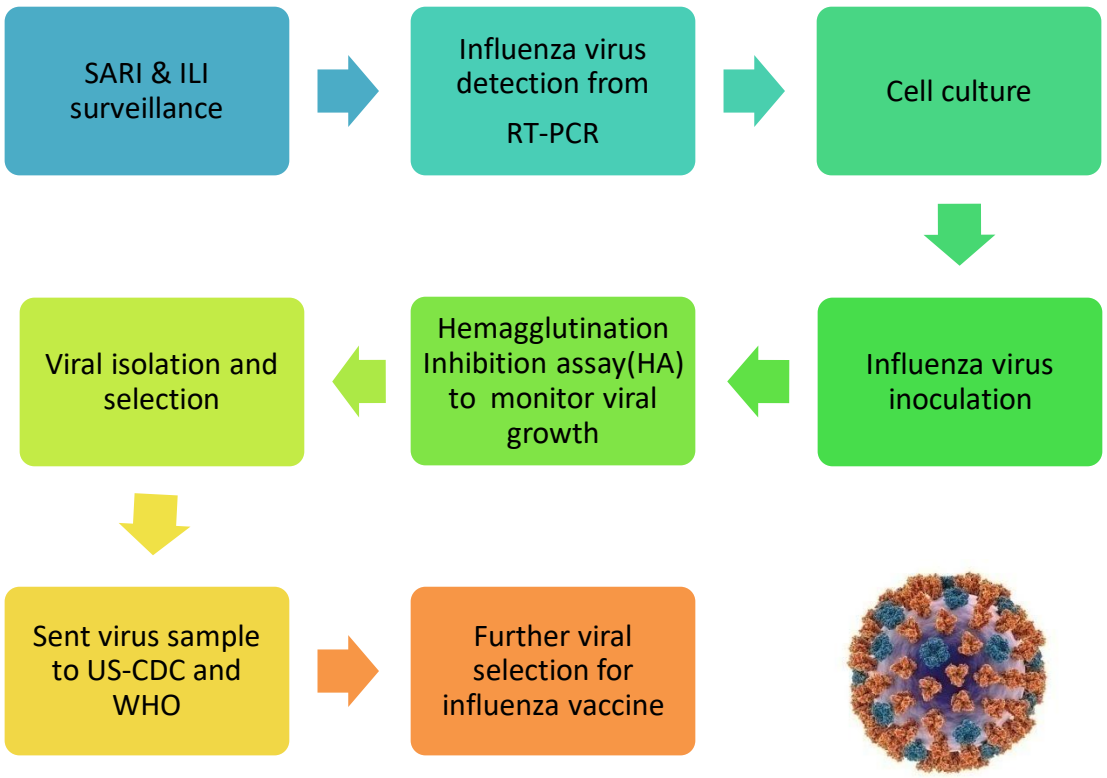
Document storage in soft copy **after** implementation of document control

Objective 6

Perform Influenza virus cell culture and virus isolation

Influenza virus cell culture is the last additional steps in SARI & ILI surveillance (details of project are in "objective 1"). The surveillance aimed to survey and detects strains of Influenza virus circulating in Bhutan and worldwide to collection Influenza virus information for US-CDC and WHO to develop Influenza vaccine for world population.

After influenza virus was detected in the laboratory, the positive samples will be processed virus cell culture and the strong strain will be selected and send to WHO and US-CDC for future study about influenza vaccine and vaccine development.



Virus cell culture in process of SARI & ILI surveillance

Virus Cell Culture & Isolation of Virus is?

Unlike bacteria, many of which can be grown on an artificial nutrient medium, viruses require a living host cell for replication. Infected host cells (eukaryotic or prokaryotic) can be cultured and grown, and then the growth medium can be harvested as a source of virus. Virions in the liquid medium can be separated from the host cells by either centrifugation or filtration. Filters can physically remove anything present in the solution that is larger than the virions; the viruses can then be collected in the filtrate

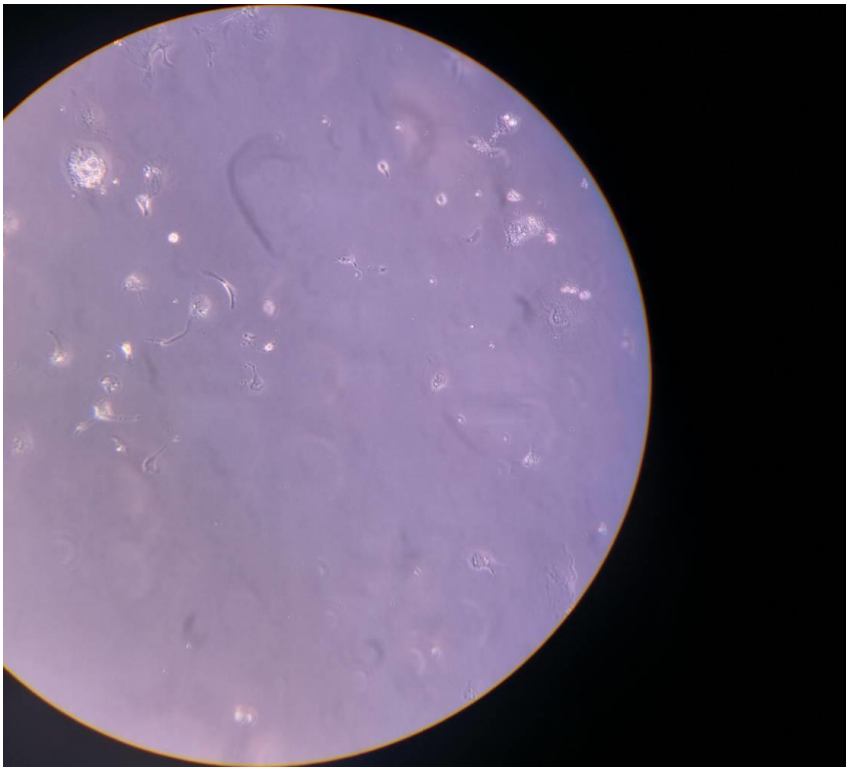
Viral culture is a laboratory technique in which samples of a virus are placed to different cell lines which the virus being tested for is able to infect. If the cells show changes, known as cytopathic effects, then the culture is positive.

Traditional viral culture has been generally superseded by shell vial culture, in which the sample is centrifuged onto a single layer of cells and viral growth is measured by antigen detection methods. This greatly reduces the time to detection for slow growing viruses such as cytomegalovirus, for which the method was developed. In addition, the centrifugation step in shell vial culture enhances the sensitivity of this method because after centrifugation, the viral particles of the sample are in close proximity to the cells. Human and monkey cells are used in both traditional viral culture and shell vial culture. Human virus types that can be identified by viral culture include adenovirus, cytomegalovirus, enteroviruses, herpes simplex virus, influenza virus, parainfluenza virus, rhinovirus, respiratory syncytial virus, varicella zoster virus, measles and mumps. For these, the final identification method is generally by immunofluorescence, with exception of cytomegalovirus and rhinovirus, whose identification in a viral culture is determined by cytopathic effects.

Virus cell culture timeline activities in VML

February 2020

- Start the first cell culture by using Madin-Darby Canine Kidney (MDCK) cells by following steps.
    - Prepare media for cell culture
    - Thawed and inoculated MDCK cell in the media
    - Observe cell growth under inverted microscope



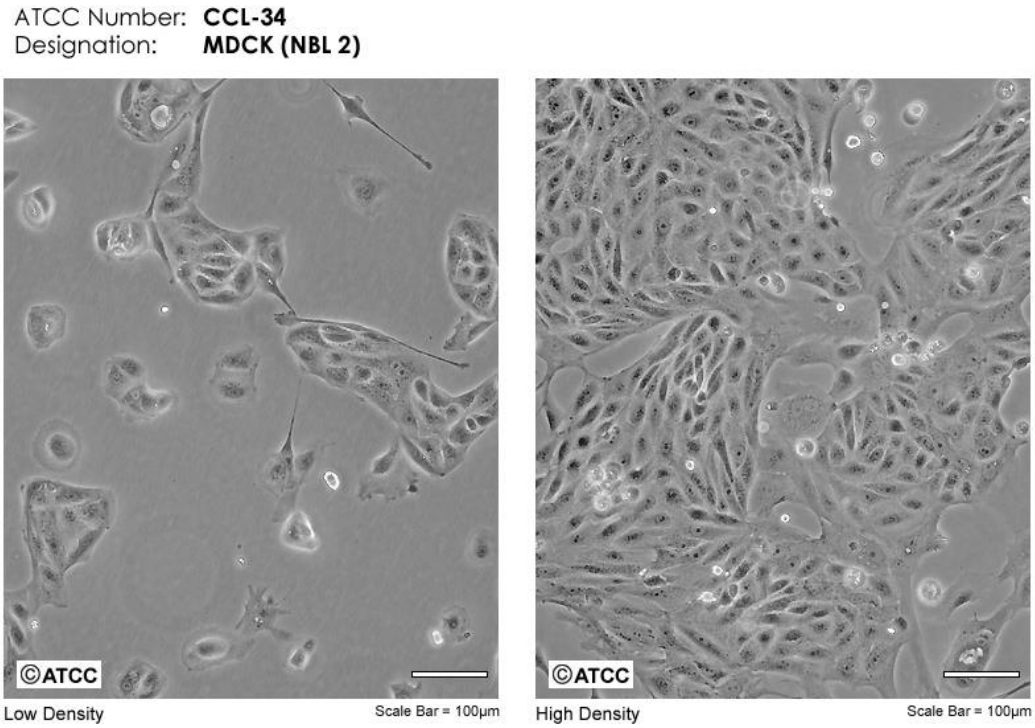
Only few MDCK cell growth on growth media under inverted microscope in the first batch cell culture

➢ **Problem and suggestion**

1. The first batch of cell culture gave unsatisfied results, as discussed with the staffs found that old batch of MDCK cell mother was supplied by AFRIMS Thailand since

2016. These cells had to be storage in -150℃ deep freezer. RCDC had not enough UPS facility to maintain electric supplies lead to frequent electric black out happens especially in winter time. This made temperature of deep freezer was higher than -150℃, so the storage cells was damage and improper maintain growth efficiency by this reason. As well as all media for cell culture was expired for many months, So VML plan to request new batch of MDCK cell and media from AFRIM for next batch experiment.

2. One batch of cell culture usually takes 1-3 months since start process (media preparation) to virus growth observation by HA, on March 2020 Bhutan got affected by COVID-19, so VML have to suspended current routine work and became National COVID-19 testing center. For this reason, the experiment was processed until 3rs day virus inoculation and had to be canceled.



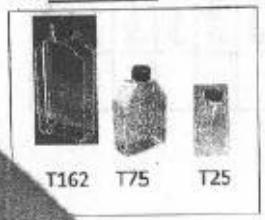
MDCK cell properly growth in media by https://www.atcc.org/products/all/CCL-34

SN	Lab	Category	Name	Checklist by Bhutan Lab	Amount required	Manufacturer	Model/Cat.No.
1	Cell culture	Reagent	Dulbecco's Modified Eagle Medium (DMEM)(500ml)	All Expired	10 bt	GIBCO	11965-092
2	Cell culture	Reagent	Fetal Bovine Serum, qualified (US)(500ml)	Out of stock	2 bt	Gibco	26140-079
3	Cell culture	Reagent	L-Glutamine, 200 mM, (100X)(100ml)	All Expired	2 bt	Gibco	25030-081
4	Cell culture	Reagent	MEM Non-Essential Amino Acids Solution (NEAA)(100ml)	All Expired	2 bt	Gibco	11140-050
5	Isolation	Reagent	Gentamicin reagent solution (50 mg/ml), (20 ml) (for Maintenance medium)	Out of stock	5 bt	Gibco	Cat. No. 15750-060 or 15750-078
6	Isolation	Reagent	Fungizone Amphotericin B (250 µg/ml) (20 ml) (for Maintenance medium)	Out of stock	5 bt	Gibco	Cat. No.15290-018
7	Isolation	Reagent	7.5% (W/V) Sodium Bicarbonate solution, filtered sterile	Out of stock	1 bt	Gibco	Cat. No. 25080-094
8	Cell culture	Reagent	Penicillin Streptomycin Solution (P&S) (10,000 units Penicillin, 10,000 µg/ml Streptomycin) 100X(100ml)	All Expired	2 bt	Gibco	15140-122
9	Cell culture	Reagent	Dimethyl Sulfoxide (DMSO)(500ml)(for frezing cell)	Out of stock	1 bt	Sigma	D-5879
10	Cell culture	Reagent	Trypan Blue (Direct Blue 14) C.I.23850 (for counting cell)	Out of stock	1 bt	Coleman&Bell	N/A
11	Cell culture	Reagent	BSA (Albumin from Bovine Serum)(for Maintenance medium)	Out of stock	5 bt	Sigma	Cat. No. A2058-25G
12	Cell culture	Reagent	Trypsin (1:250)(for Trypsin solution)	Out of stock	2 bt	Gibco	27250-018
13	Cell culture	Reagent	HEPES (1M)(100ml)	All Expired	2 bt	Gibco	15630-080
14	Cell culture	Consumable	Coring Filter 250 ml	5 in stock	10 bt	Coring	NA
15	Cell culture	Reagent	10X Versene 1tube/500 ml	Out of stock	1 tube	NA	NA

Checklist of Cell culture reagent and consumable required from Bhutan lab to AFRIMS, by volunteer

Thaw Cells

1. Add Growth Medium (GM) into the Culture Flask
   [DMEM+10%FBS+L-Glu+P&S+NEAA]
   - T162 add 50 ml./flask
   - T75 add 25 ml./flask
   - T25 add 6 ml./flask
2. Bring MDCK cells from Liquid N2
3. Thaw MDCK cells in Water Bath at 35±2°C, 2 min or until cell thawed 90%
4. Collect MDCK cell suspension into the Culture Flask [Culture Flaks containing GM in the step.1]
5. Gently Rock by hand
   [Purpose: To Spread Cells in the flask]
6. Incubate at 35±2°C, overnight
7. Next day : Change the Medium for Cell lines.
   - Pour off the old medium
   - Add the new Growth Medium:
     - T162 add 50 ml./flask
     - T75 add 25 ml./flask
     - T25 add 6 ml./flask
8. Incubate at 35±2°C, 3-4 days or until cell growth 100%
9. Sub-Culture the cell lines.



Sub Culture

1. Bring MDCK cells from Incubator
   - T162 contains of GM 50 ml./flask
   - T75 contains of GM 25 ml./flask
   - T25 contains of GM 6 ml./flask
2. Observe Cell Morphology under Inverted Microscope
3. Bring MDCK Cells into the Laminar Flow (BSC Class II)
4. Pour off the old Medium into sterile Beaker
5. Wash the MDCK cell by using Trypsin or 1xPBS, 2 times
   - T162 use 10-15 ml./flask
   - T75 use 5 ml./flask
   - T25 use 2-3 ml./flask
6. Pour off the trypsin or 1xPBS into sterile Beaker
7. Add trypsin into the culture flask
   - T162 use 10-15 ml./flask
   - T75 use 5 ml./flask
   - T25 use 2-3 ml./flask
8. Incubate at 35±2°C, 4-5 min.
9. Pour off the trypsin & leave a bit trypsin in the flask
   - T162 leave trypsin 2-3 ml./flask
   - T75 leave trypsin 1-2 ml./flask
   - T25 leave trypsin 0.5-1 ml./flask
10. Incubate at 35±2°C, 2-3 min.
11. Tap the culture flask to release attached cells
12. Add GM [T162 = 10 ml/flask, T75= 5 ml/flask ,T25 2-3 ml./flask] &,gently pipetting up & down

Freeze Cells

1. Prepare the Freezing Medium [30%FBS+8%DMSO+DMEM]
2. Keep Freezing Medium at refrigerator at 4°C
3. Sub-Culture
4. Collect the cell suspension from step.3 and transfer to the centrifuge tube
5. Remove some cell to count
6. Centrifuge at 1,000 rpm,10 min.4°C
7. Pour off the medium & collect the cell pellet
8. Gently tap the cell pellet in centrifuge tube
9. Resuspend the cell pellet with Freezing Medium [Keep cells 3-5 x 10^6 cell/ml]
10. Transfer the cell suspension into cryotube [1 ml./tube]
11. Place the cryotube into the Freezing Box [Freezing Box contains Isopropanol]
12. Keep the Freezing Box in Freezer at -70°C, Overnight
13. Keep the Cryotube in the Liquid N_2

Cell preparation for Flu.Isolation

1. Add GM into the Flask
2. Sub-culture
3. Collect cell suspension & squeeze cell in T25
4. Transfer some cell suspension into the flask in Step.1
5. Cell counting (1.8-2x10^5 cell/ml)
6. Pipette the cell suspension from flask to culture slant tube 1.5 ml./tube

...ate the culture slant tube at 35±2 °C, overnight
...or Flu.Inoculation (Use day 1)

Cell culture protocol by AFRIMS, Thailand

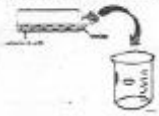
ulture in Our Lab:

Mammalian Cells

- LLC-MK$_2$ (Rhesus Monkey Kidney Cell) : PRNT
- MDCK (Madin-Darby Canine Kidney Cell) : Flu. Virus Isolation
- Vero (African Green Monkey Kidney Cell) : FRNT

Subculturing

1. Pour off old medium into sterile container.

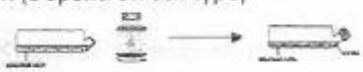


2. Wash the cells with 0.05% Trypsin 10-15 ml/flask T162
   5 ml/flask T75
   2-3 ml/flask T25

3. Pour off trypsin.

4. Add 0.05% Trypsin 10-15 ml/flask T162
   5 ml/flask T75
   2-3 ml/flask T25

incubate at RT (Room temp.) or Incubator at 35±2°C for 1-2 min (Depend on cell type)



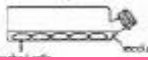
5. Pour off trypsin and leave a bit trypsin to cover the cell sheet. Then cap the flask.

6. Gentle tap the flask. Then resuspend cells with growth media (10 or 20% FBS) and split cells into the new flask.

7. Add growth media (10 or 20% FBS) 50 ml/flask T162
   25 ml/flask T75
   6 ml/flask T25

https://www.thermofisher.com/order/catalog/product/11095080

8. Incubate at 35±2°C, 3-5 days



Insect Cells

- C6/36 (Aedes Albopictus Mosquito Cell): Larva : Flavivirus Isolation.

https://en.wikipedia.org/wiki/Aedes_albopictus#/media/File:Aedes_Albopictus.jpg

Subculturing

1. Pour off old medium into sterile container.

2. Add growth media 10 ml/flask T162
   5 ml/flask T75
   2-3 ml/flask T25

https://www.thermofisher.com/order/catalog/product/11095080

3. Gently scrape the cells by using sterile rubber cell scraper.

https://morganvillesci.com/product/celltreat-cell-scraper-20-mm-blade/

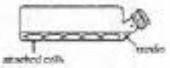
4. Pipette up and down 5-6 times to get the single cell suspension.

https://www.ebay.com/bhp/pipette-controller

5. Split cell into a new flask and add growth media
   50 ml/flask T162
   25 ml/flask T75
   6 ml/flask T25

https://www.thermofisher.com/order/catalog/product/11095080

6. Incubate at 28±1°C, 3-5 days



Cell culture protocol by AFRIMS, Thailand

Objective 7

Support Bhutan against COVID-19 in RCDC National testing center

In December 2019, a cluster of unexplained pneumonia cases was first detected in Wuhan, China which was found, later, to be caused by novel human severe acute respiratory syndrome coronavirus 2, SARS-CoV-2. As of 8 December 2020, the COVID-19 pandemic has taken toll of more than 100 and 2.5 million confirmed cases and deaths respectively. It has heavily impacted every aspect of life primarily health and economy globally. While a COVID-19 case exhibits different pattern of clinical manifestations, most are similar, if not identical, to flu syndromes. Although several studies have been conducted to explore and understand the viral dynamics, there is no consistency in the findings especially on viral load dynamics and duration of viral shedding. It is an undeniable fact that understanding viral dynamics has significant impact on making decisions for better public health interventions.

Bhutan detected its first COVID-19 case on 5th March and since then, stringent public health measures have been put in place. The first national lockdown was undertaken for 28 days after the detection of first COVID-19 case in the community.

1. Handle suspected samples of COVID-19 as National Laboratory Front-liner to detect COVID-19 by using RT-PCR method

Due to COVID19 pandemic across the world, Bhutan also got affected from the pandemic. Virology and molecular laboratory (VML), RCDC was assigned as a COVID-19 National Laboratory Testing, for this reason all staffs in VML were assigned to be front line staffs to test COVID-19 suspected samples, including Thai volunteer as well. Hence, all work plan and laboratory current project were suspended until the situations will back to normal condition.

As the *coronavirus* that causes the COVID-19 disease spreads across the world, the IAEA, in partnership with the Food and Agriculture Organization of the United Nations (FAO), is offering its support and expertise to help countries use real time reverse transcription–polymerase chain reaction (real time RT–PCR), one of the most accurate laboratory methods for detecting, tracking and studying the COVID-19 coronavirus.

But what is real time RT–PCR? How does it work? How is it different from PCR? And what does this have to do with nuclear technology? Here's a handy overview of the technique, how it works and a few refresher details on viruses and genetics.

What is real time RT–PCR?

Real time RT–PCR is a nuclear-derived method for detecting the presence of specific genetic material in any pathogen, including a virus. Originally, the method used radioactive isotope markers to detect targeted genetic materials, but subsequent refining has led to the replacement of isotopic labelling with special markers, most frequently fluorescent dyes. This technique allows scientists to see the results almost immediately while the process is still ongoing, whereas conventional RT–PCR only provides results at the end of the process.

Real time RT–PCR is one of the most widely used laboratory methods for detecting the COVID-19 virus. While many countries have used real time RT–PCR for diagnosing

other diseases, such as Ebola virus and Zika virus, many need support in adapting this method for the COVID-19 virus, as well as in increasing their national testing capacities.

What is a virus? What is genetic material?

A **virus** is a microscopic package of genetic material surrounded by a molecular envelope. This genetic material can be either deoxyribonucleic acid (DNA) or ribonucleic acid (RNA).

DNA is a two-strand molecule that is found in all organisms, such as animals, plants and viruses, and which holds the genetic code, or blueprint, for how these organisms are made and develop.

RNA is generally a one-strand molecule that copies, transcribes and transmits parts of the genetic code to proteins so that they can synthetize and carry out functions that keep organisms alive and developing. Different variations of RNA are responsible for copying, transcribing and transmitting.

Some viruses such as the coronavirus (SARS-CoV-2), which causes COVID-19, only contain RNA, which means that they rely on infiltrating healthy cells to multiply and survive. Once inside the cell, the virus uses its own genetic code — RNA in the case of the COVID-19 virus — to take control of and 'reprogramme' the cells, turning them into virus-making factories.

In order for a virus like the COVID-19 virus to be detected early in the body using real time RT–PCR, scientists need to convert the RNA to DNA. This is a process called 'reverse transcription'. They do this because only DNA can be copied — or amplified — which is a key part of the real time RT–PCR process for detecting viruses.

Scientists amplify a specific part of the transcribed viral DNA hundreds of thousands of times. Amplification is important so that, instead of trying to spot a minuscule amount of the virus among millions of strands of genetic information, scientists have a large enough quantity of the target sections of viral DNA to accurately confirm that the virus is present.

How does real time RT–PCR work with the COVID-19 virus?

A sample is collected from the parts of the body where the COVID-19 virus gathers, such as a person's nose or throat. The sample is treated with several chemical solutions that remove substances such as proteins and fats and that extract only the RNA present in the sample. This extracted RNA is a mix of the person's own genetic material and, if present, the virus's RNA.

The RNA is reverse transcribed to DNA using a specific enzyme. Scientists then add additional short fragments of DNA that are complementary to specific parts of the transcribed viral DNA. If the virus is present in a sample, these fragments attach themselves to target sections of the viral DNA. Some of the added genetic fragments are used for building DNA strands during amplification, while the others are used for building the DNA and adding marker labels to the strands, which are then used to detect the virus.

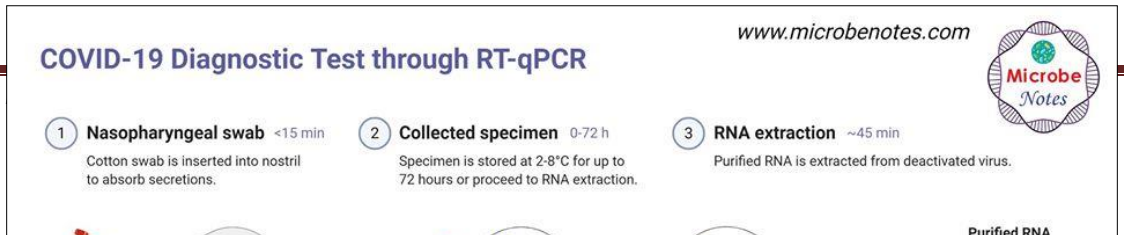
The mixture is then placed in an RT–PCR machine. The machine cycles through temperatures that heat and cool the mixture to trigger specific chemical reactions that create new, identical copies of the target sections of viral DNA. The cycle is repeated over and over to continue copying the target sections of viral DNA. Each cycle doubles the previous number: two copies become four, four copies become eight, and so on. A standard real time RT–PCR set-up usually goes through 35 cycles, which means that, by the end of the process, around 35 billion new copies of the sections of viral DNA are created from each strand of the virus present in the sample.

As new copies of the viral DNA sections are built, the marker labels attach to the DNA strands and then release a fluorescent dye, which is measured by the machine's computer and presented in real time on the screen. The computer tracks the amount of fluorescence in the sample after each cycle. When a certain level of fluorescence is surpassed, this confirms that the virus is present. Scientists also monitor how many cycles it takes to reach this level in order to estimate the severity of the infection: the fewer the cycles, the more severe the viral infection is.

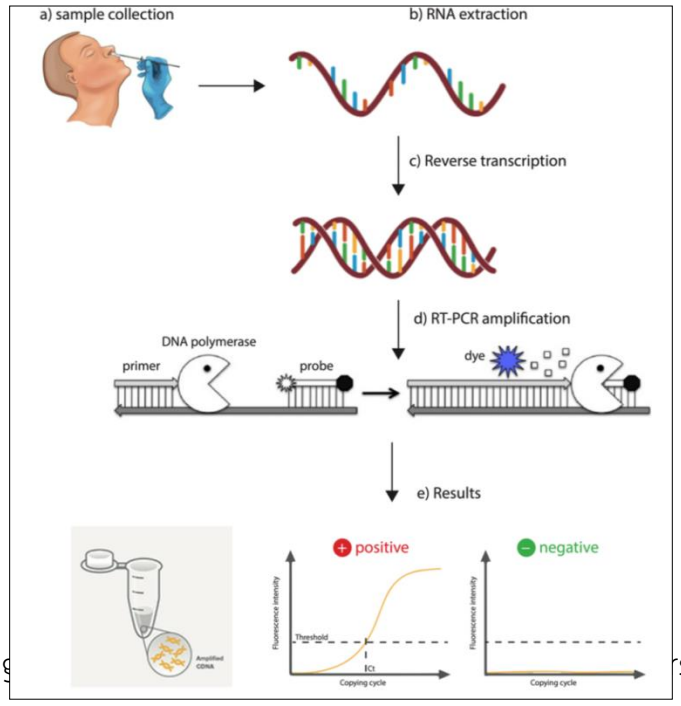
Laboratory detection in RCDC

Viral RNA was extracted from 200µl of nasopharyngeal swab collected in Viral Transport media using QIAamp viral RNA mini kit (QIAGEN, Germany) and Quick-RNATM Viral Kit (Zymo Research, USA) following the manufacturer's instructions. Extracted Viral RNA was subjected to RT-PCR using Detection kit for 2019 Novel Coronavirus (2019-nCOV) RNA (PCR-Fluorescene Probing) (DaAnGene, China), targeting open reading frame 1ab (ORF1ab) and nucleocap-sid protein (N) genes 5µl of eluted viral RNA was added in the tube containing the mixture of 17µl of Reagent A and 3µl of Reagent B. The cycling condition was set at 1 cycle for 15 minutes for 50°C, 15 minutes for 95°C followed by 45 cycles of 94°C for 15 seconds and 55° for 45 seconds. Ct value <40 was considered positive.

Subsequently Standard M nCOV Real-Time Detection Kit (SD Biosenser, Korea) targeting Envelop gene and ORF1ab gene was also used. A total of 30µl reaction was prepared comprising of 10µl of eluted viral RNA, 14µl of 2019-nCOV Reaction solution, 6µl of RTase mix, 0.5µl of ROX references and 0.5µl of Internal Control. The cycling condition consisted of 1 cycle for 15 minutes for 50°C, 3 minutes for 95°C followed by 5 cycles of pre amplification at 95 °C for 5 seconds, 60°C for 40 seconds followed by 40 cycles of 95°C at 5 seconds, 60°C for 40 seconds. Ct value <36 was considered positive. For each protocol Positive and negative controls were run in each test to valid the test result.

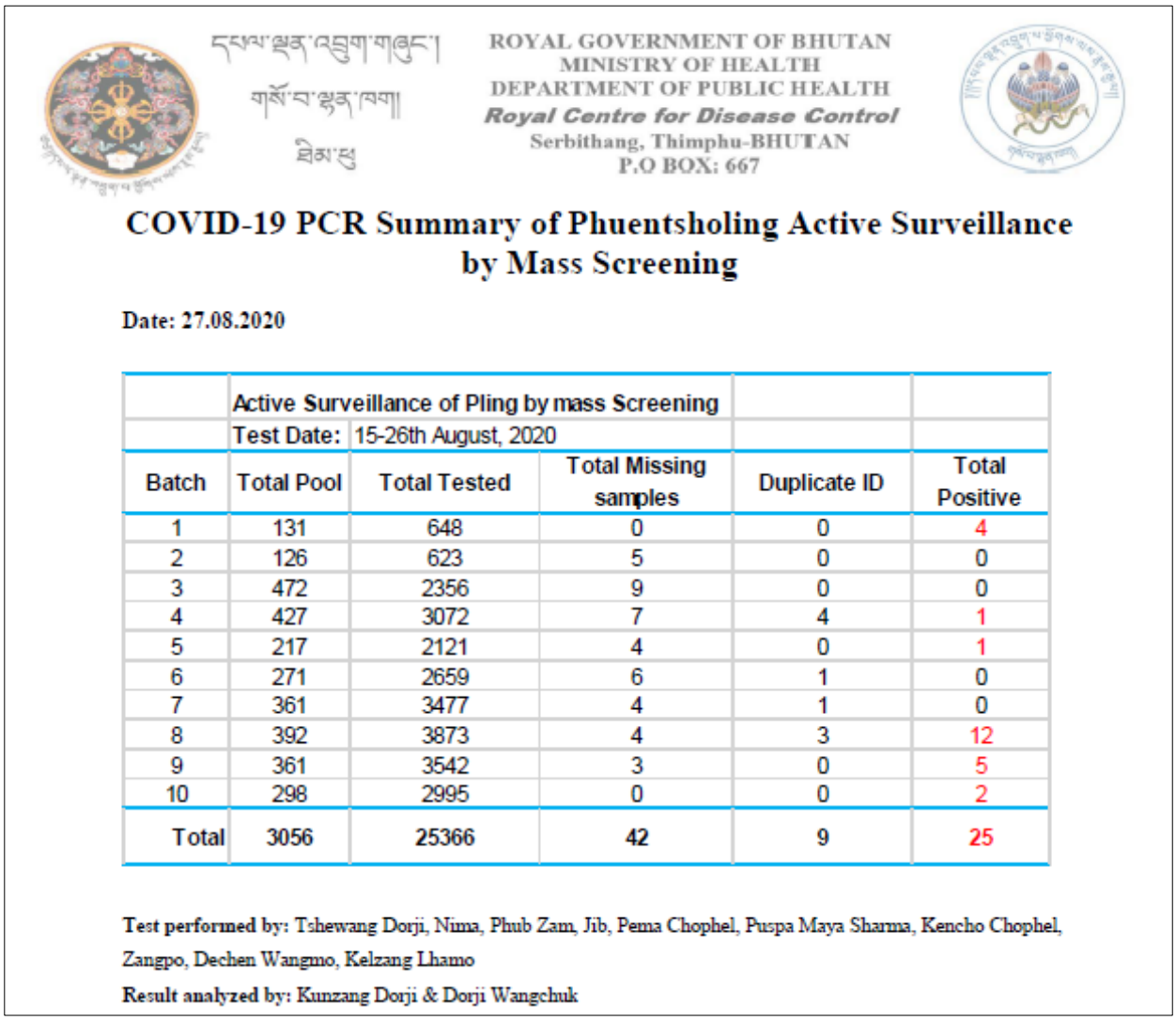


COVID-19 Diagnosis test through RT-PCR



On 11th Aug[illegible]rst nationwide lockdown. The cluster of COVID-19 cases was increased in Phuentsholing (the big city in Bhutan and India boundary), Bhutan government decided to performed mass screening COVID-19 for

population in the area, total up to 30,000 samples were tested at RCDC of 15 days of mass screening, volunteer also played the key role for sample management and work flow in the lab.



ROYAL GOVERNMENT OF BHUTAN
MINISTRY OF HEALTH
DEPARTMENT OF PUBLIC HEALTH
Royal Centre for Disease Control
Serbithang, Thimphu-BHUTAN
P.O BOX: 667

COVID-19 PCR Summary of Phuentsholing Active Surveillance by Mass Screening

Date: 27.08.2020

	Active Surveillance of Pling by mass Screening				
	Test Date:	15-26th August, 2020			
Batch	Total Pool	Total Tested	Total Missing samples	Duplicate ID	Total Positive
1	131	648	0	0	4
2	126	623	5	0	0
3	472	2356	9	0	0
4	427	3072	7	4	1
5	217	2121	4	0	1
6	271	2659	6	1	0
7	361	3477	4	1	0
8	392	3873	4	3	12
9	361	3542	3	0	5
10	298	2995	0	0	2
Total	3056	25366	42	9	25

Test performed by: Tshewang Dorji, Nima, Phub Zam, Jib, Pema Chophel, Puspa Maya Sharma, Kencho Chophel, Zangpo, Dechen Wangmo, Kelzang Lhamo
Result analyzed by: Kunzang Dorji & Dorji Wangchuk

Phuntsholing mass screening report 15th – 26th August 2020

on 21th December 2020 to 29th January 2021 there was second wave of COVID-19 in Thimphu and Paro, more than 350 cases detected in this wave, the city was under lockdown for one and a half month, RCDC testing team did RT-PCR test for more than

100,000 test with 28 staffs, so Thai volunteer got assigned to look after samples verification, data variation and reporting the test result to focal person

COVID-19 PCR Summary Report from 2020-12-21 to 2021-01-29 by Testing Center

Testing Centre	Number of Samples	First Sample		Subsequent Sample		Total		New Positive
		Negative	Positive	Negative	Positive	Negative	Positive	
Royal Centre for Disease Control	156619	95467	315	60613	224	156080	539	404
Phuentsholing Hospital	13058	5172	2	7853	31	13025	33	12
Monggar ERRH	4218	3318	5	891	4	4209	9	8
Gelephu CRRH	2795	2211	0	584	0	2795	0	0
Dewathang Hospital	2040	1164	0	873	3	2037	3	3
JDWNRH	2199	615	0	1569	15	2184	15	3

Dashboard shown total COVOD-19 testing during lockdown, more than 150,000 tested in RCDC testing center (21th December 2020 – 29th January 2021)

Volunteer worked on samples receiving and data verifying for COVID-19 samples during second lockdown(21th December 2020 – 29th January 2021)


VIROLOGY AND MOLECULAR
LABORATORY


VIROLOGY AND MOLECULAR


BIO - SAFETY LEVEL 3
LABORATORY


VIROLOGY
LABORATORY

2. Train new staffs who joined RCDC testing center for COVID-19 Molecular testing

Initially, Bhutan has only one COVID-19 testing center at Royal Centre for Disease control. The number of suspected case was increased due to Bhutanese migrated back to the country from aboard. Moreover, Bhutan share southern border with India which is the current epidemic center of COVID-19. On April 2020, Bhutan government concerned about community transmission, especially in the border areas. So, the government ordered to RCDC to establish more COVID-19 testing center in Phuntsholing, Gelephu and Mongar to monitor trend and to follow the early detection plan in case of local transmission occurred in Bhutan

According to less among of staffs in the first center laboratory in Thimphu, so government allocated laboratory person from the district hospitals to join COVID-19 National Laboratory Testing

Activities & Achievement

1. New COVID-19 testing centers were established in Phuntsholing, Mongar and Guelphu and Dewathang respectively. At the first establishment, due to insufficient of professional and experienced staffs from COVID-19 National Laboratory Testing (RCDC) had to move to the district to install the lab and settled there for few months.

2. Trained new staffs to do molecular testing for COVID-19 sample, after 3 months of training, staffs are able to move to district center to handle COVID-19 testing lab effectively.

COVID-19 testing center in other districts of Bhutan, implemented by RCDC team

Volunteer and team after finished COVID-19 training course

3. Support RCDC to presentation about integrate COVID-19 into Influenza surveillance in other district of Bhutan

To prevent and to early detection of COVID-19 community transmission in the country, so Bhutan government has been launch COVID-19 and Influenza surveillance integrate system to 123 hospitals and primary health centres all over the country. RCDC and COVID-19 National laboratory testing staffs have responsibility to conduct training at each health centres about the purpose of the project and communicate to the district health centre to perform sample collection and case diagnosis and report to the centre as well.

➢ Activities & Achievement

Volunteer supported RCDC and team to conduct presentation in district hospital as well as management & supply test kit and sample collection consumables to district hospital, volunteer joined 2 presentations at Paro and Haa hospital in June to May 2020

Volunteer and team on the way to presentation about COVID-19 and Influenza integrating surveillance to Paro district on June 2020

4. Conduct training for new staffs for sample collection and Rapid test for COVID-19

Volunteer cooperated with RCDC team conducted training for COVID-19 sample collection and Rapid test kit to make 13 new staffs understand and be able to go to field to collect the sample rightfully. The training performed on 12th to 14th July 2020

Activities & Achievement

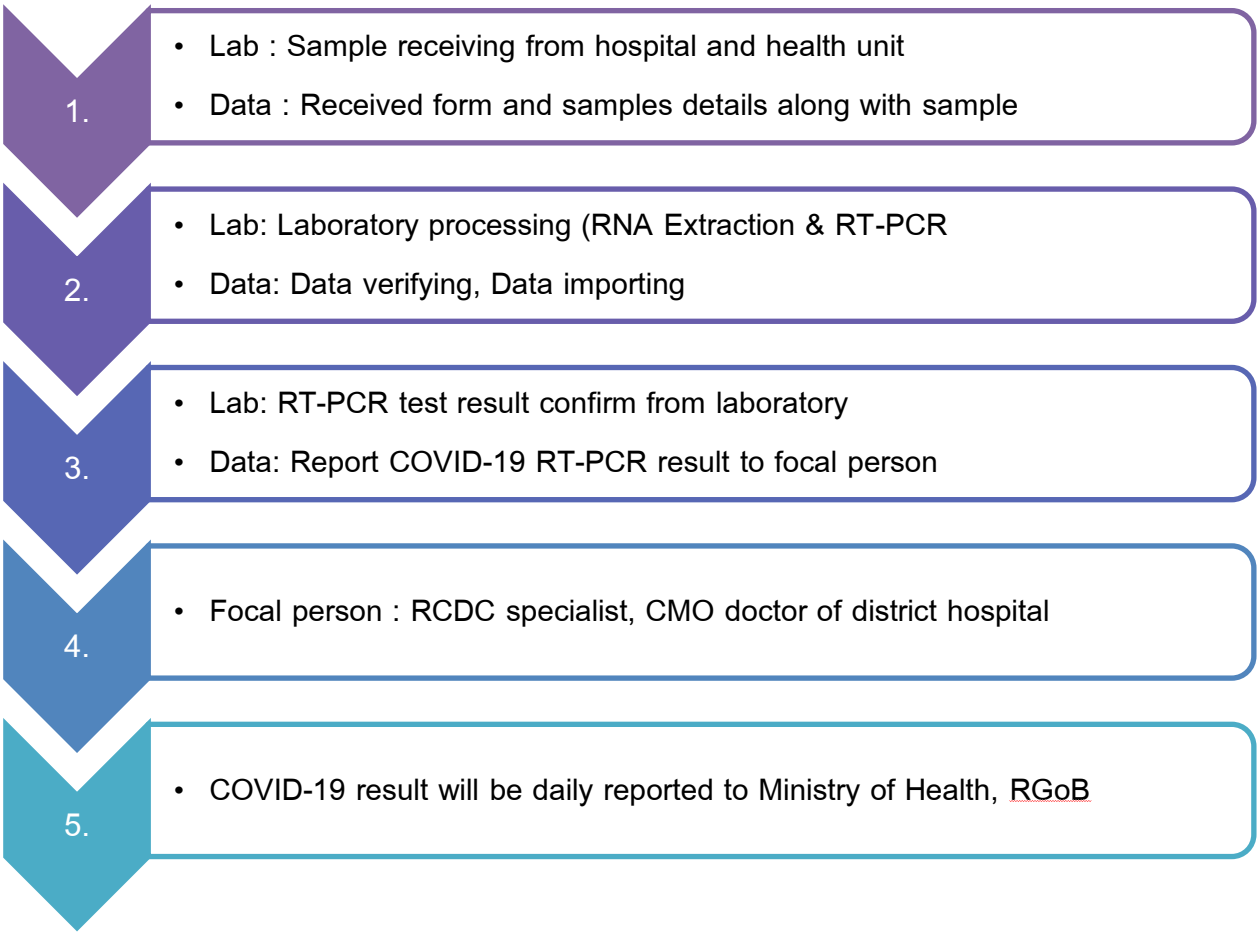
All trained new staffs join sample collection team right after training; they are able to work with more efficiency with professional team, and work according to the protocol. No repeating of test after receiving samples from them and they can work follow Biosafety protocol without got any infection from positive case in the field

Volunteer and RCDC testing team conducted training for new staffs in sample collection and Rapid test for COVID-19 on 12th -14th July 2020

5. Engaged in COVID-19 data & reporting

After RT-PCR testing for suspected COVID-19 samples, data cleaning and importing into national COVID-19 system have to be done in a part of laboratory as well. Only 1 staffs is involved with data and reporting, that was Miss Lila Adikari, Senior Laboratory Officer from Tuberculosis Laboratory, RCDC. After 8 months of pandemic, data people have to stand by 24 hrs to communicate with focal person about data and reporting COVID-19 lead to fatigue and brained out. So volunteer was assigned to take in charge of data and reporting for COVID-19 from November 2020 to March 2021.

Flow of COVID-19 testing and reporting



Case Investigation and Specimen Collection Form for COVID-19, ILI and SARI (Version-5)

Case Type (Please tick): ☐ **Suspect COVID-19** ☐ **ILI** ☐ **SARI**

SECTION 1: PATIENT INFORMATION

Name of Health Centre:			
Patient Name:		Age:	Sex:
Contact Number:		CID number:	
Present Address:		Nationality:	
Occupation:		Country of Residence (those residing abroad)……	

SECTION 2: CLINICAL INFORMATION

Fever or History of fever:	☐ Yes	☐ No	If Yes, Temperature:…….		
Cough:	☐ Yes	☐ No	Shortness of Breath:	☐ Yes	☐ No
Sore throat:	☐ Yes	☐ No	Diarrhea	☐ Yes	☐ No
Headache	☐ Yes	☐ No	Nausea/Vomiting	☐ Yes	☐ No
Loss of Smell/taste	☐ Yes	☐ No	Abdominal pain/blotting	☐ Yes	☐ No
Musculoskeletal pain	☐ Yes	☐ No	Fatigue	☐ Yes	☐ No
Chills	☐ Yes	☐ No	Others (Specify):		

Co-morbid conditions (Tick all that apply): ☐None ☐Diabetes ☐Cardiac Disease ☐Hypertension ☐Pulmonary Disease ☐Kidney Disease ☐Liver Disease ☐Immuno-compromised ☐Pregnancy ☐Others specify……

Hospitalization: ☐Yes ☐No (If Yes, Date of Admission:……) **Outcome:** ☐Recovered ☐Referred ☐Death

SECTION 3: EPIDEMIOLOGICAL INFORMATION

Date of notification:_____ Date of onset:_____

Does the patient have Travel History within 21 days before the onset of symptoms: ☐Yes ☐No
If yes, place visited and country……Travel date from…….. to……..

Any contact with visitor, visiting in last 21 days from affected place (in/ex country): ☐Yes ☐No
If yes, date and contact place……

In past 21 days, have you had contact with a person with confirmed COVID-19 case: ☐Yes ☐No If Yes, date and place ……

Advised by (Doctor's name and Contact number):……..

SECTION 4: LABORATORY SPECIMENS COLLECTED

Specimen No: _____ **Date of Collection:** …. /…. /……. (dd/mm/yyyy)

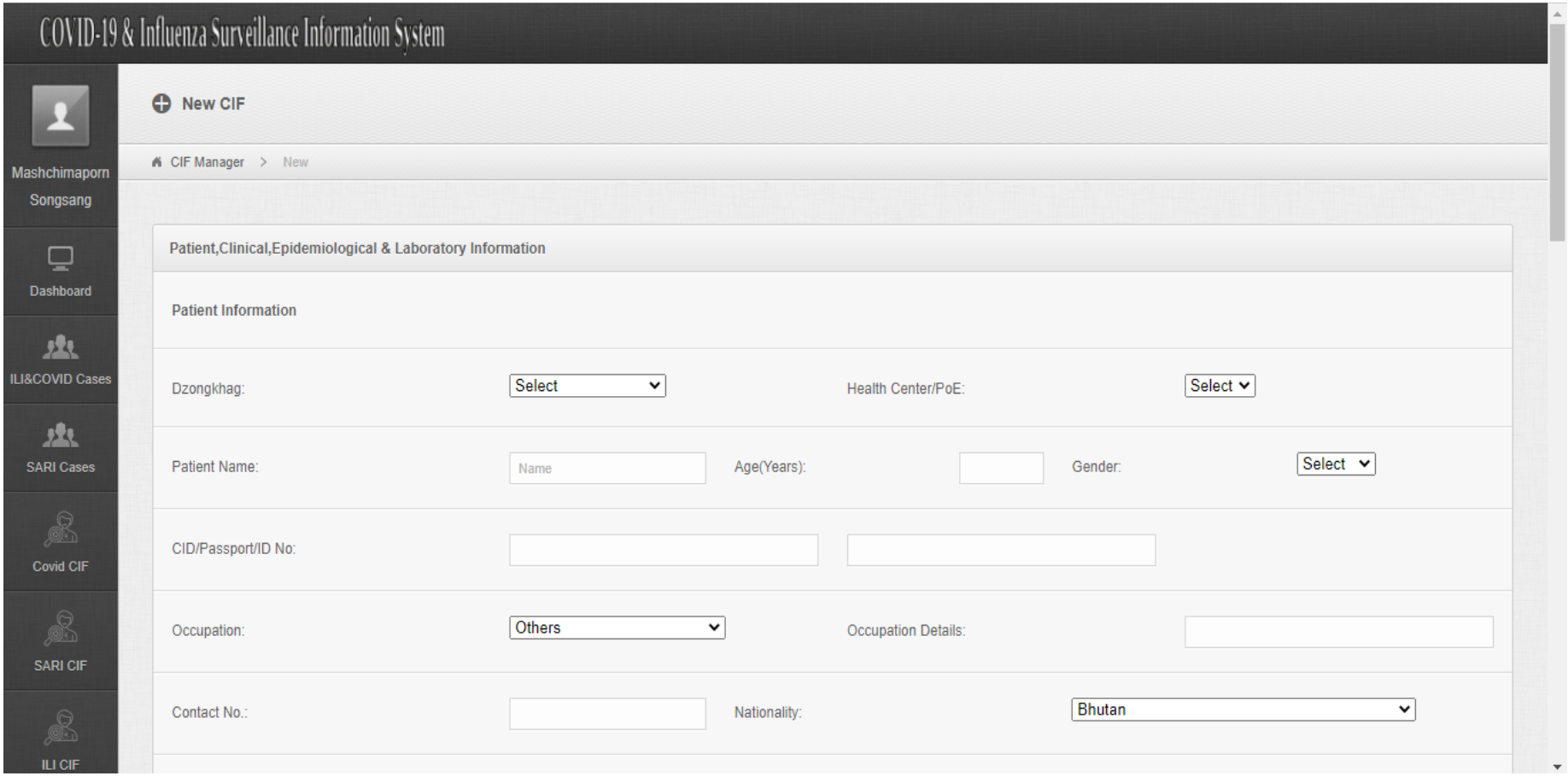
Type of Specimen Collected:	**If Rapid diagnostic test done, result:**
☐ Nasal swab	☐ Positive Flu A
☐ Throat swab	☐ Positive Flu B
☐ Nasopharyngeal swab	☐ COVID-19 IgM Positive
☐ Blood	☐ COVID-19 IgG Positive
☐ Sputum	☐ COVID-19 Ag Positive
☐ Others, please specify: _____	☐ Negative for ……..

☐1st Sample ☐2nd Sample ☐3rd Sample ☐Specify if other: ……

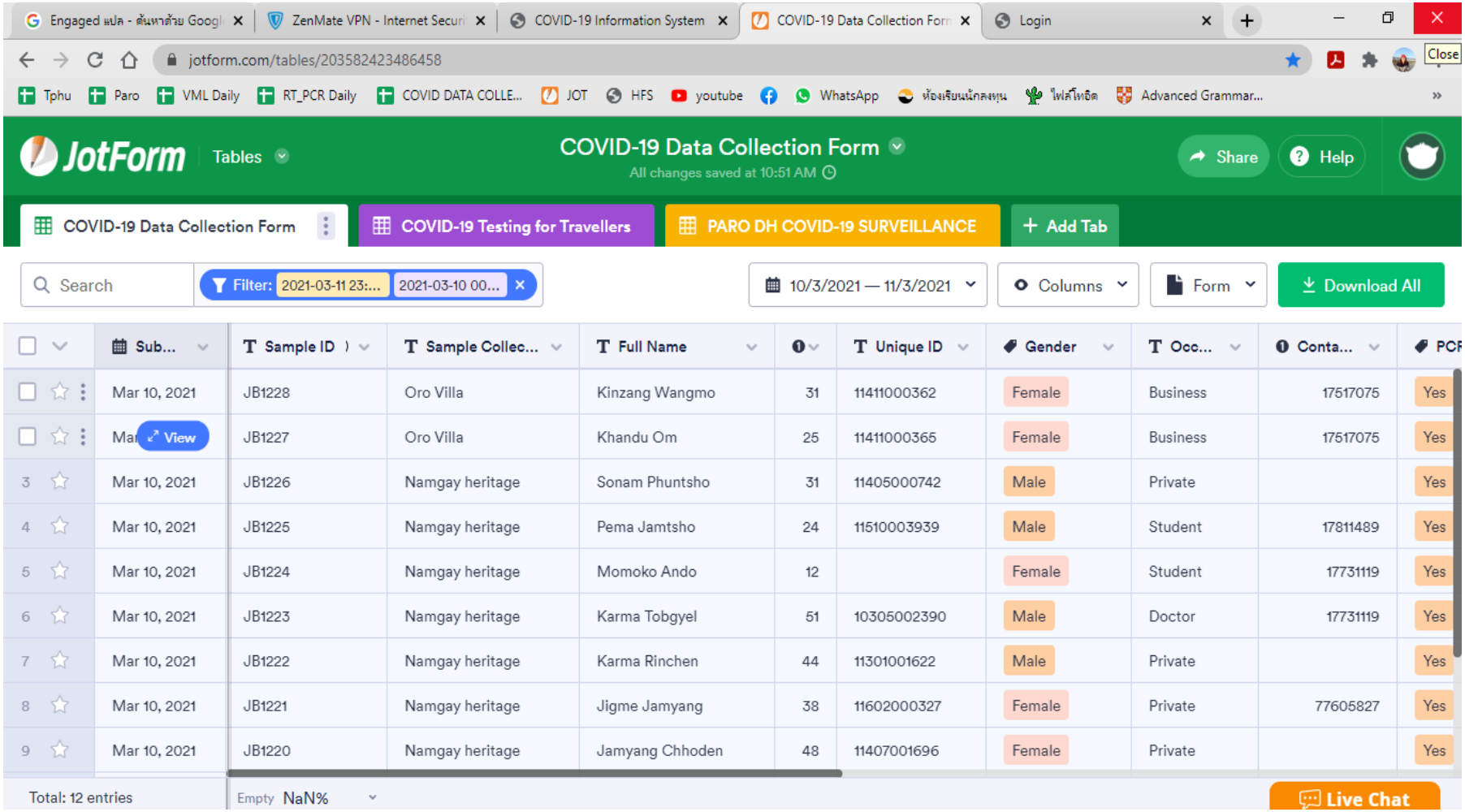
Collection Site: ☐Flu clinic ☐OPD ☐IPD ☐Quarantine site ……

Sample Collected by (Name and contact number): ……..._____

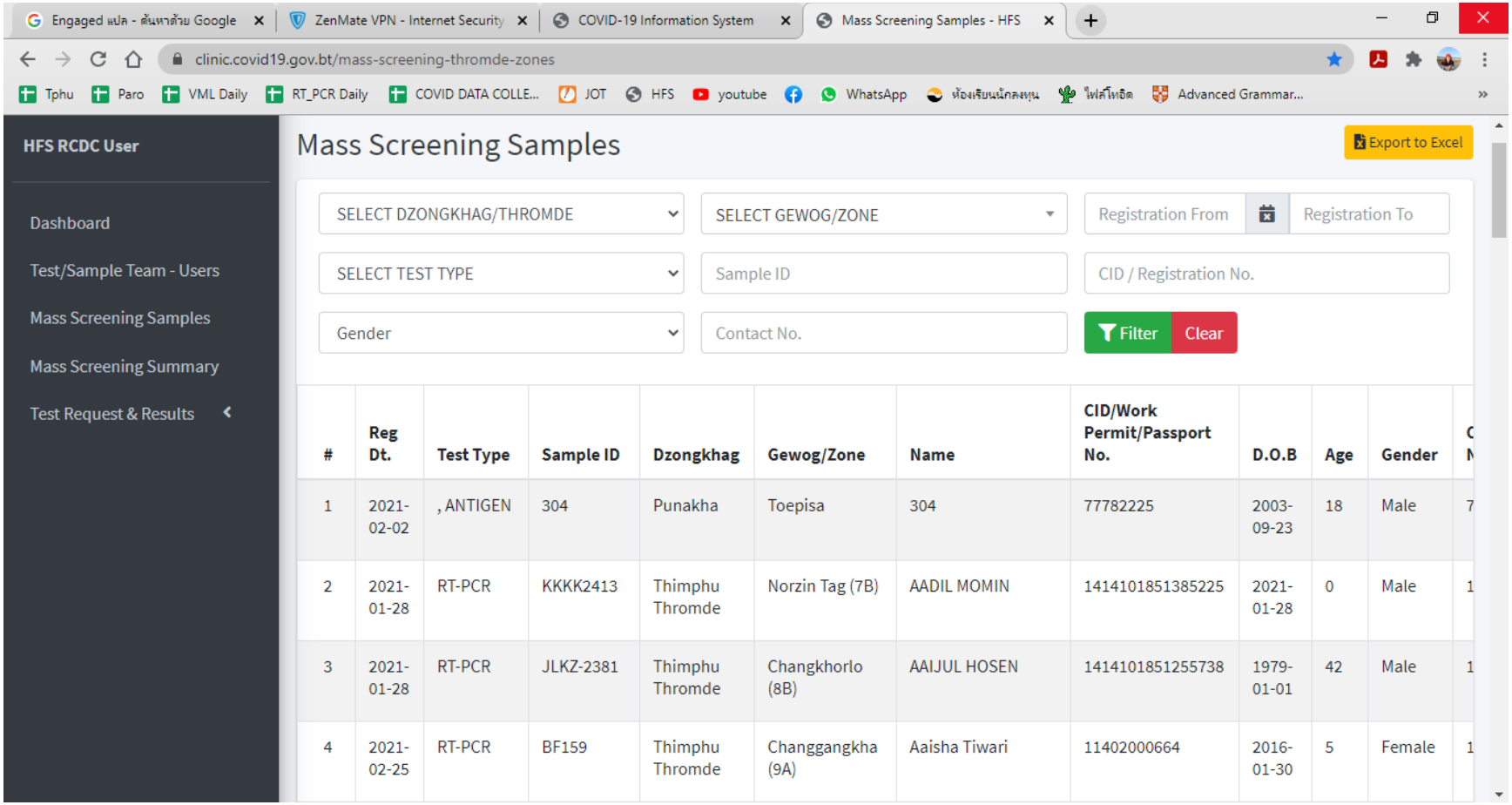
COVID-19 form to collect sample detail



COVID-19 system to record and generate testing report



JOTFORM : COVID-19 online data collection from



HFS system: COVID-19 online data collection from for mass screening and community screening

དཔལ་ལྡན་འབྲུག་གཞུང་།

གསོལ་བ་སྤྱན་ཁག།

ཐིམ་ཕུ

ROYAL GOVERNMENT OF BHUTAN
MINISTRY OF HEALTH
DEPARTMENT OF PUBLIC HEALTH
Royal Centre for Disease Control
Serbithang, Thimphu-BHUTAN
P.O BOX: 667

Report Date:2021-02-01

RT-PCR Result for COVID-19

Test Centre: ***Royal Centre for Disease Control***

Sl.No	Specimen ID	Sample No	Name	CID/Passport	Age	Gender	Occupation	MobileNo	Collected By	Collected From	Collection Date	PCR Result
1	COVID-CHU-0497	2	Kunzang Tshering A	[redacted]	47.00	Male	Driver(RBA Driver)	17593346	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
2	COVID-CHU-0498	2	Cheten Tshering	[redacted]	46.00	Male	Driver(RBA Driver)	17679768	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
3	COVID-CHU-0499	3	Jamphel Tshering	[redacted]	47.00	Male	Driver(RBA Driver)	17602756	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
4	COVID-CHU-0500	2	Pelzang Namgay	[redacted]	50.00	Female	Driver(RBA Driver)	17738105	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
5	COVID-CHU-0501	2	Tshering Phuntso	[redacted]	39.00	Male	Driver(RBA Driver)	17304875	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
6	COVID-CHU-0502	2	Sonam Jamtsho	[redacted]	39.00	Male	Driver(RBA Driver)	17835697	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
7	COVID-CHU-0503	2	Chogyel Wangdi	[redacted]	38.00	Male	Driver(RBA Driver)	17655473	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
8	COVID-CHU-0504	2	Ugyen Dorji	[redacted]	38.00	Male	Driver(RBA Driver)	17658247	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
9	COVID-CHU-0505	3	Nado	[redacted]	39.00	Male	Driver(RBA Driver)	17656336	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
10	COVID-CHU-0506	4	Nima Tshering	[redacted]	38.00	Male	Driver(RBA Driver)	17599675	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
11	COVID-CHU-0507	3	Kunzang Tshering B	[redacted]	51.00	Male	Driver(RBA Driver)	17625247	Chhukha BHU I	Frontliner(Chukha)	2021-02-01	**Negative**
Test Performed On				2021-02-01								
Test Performed By				Tshewang Dorji,Nima,Pema Chophel,Dechen Wangmo,Januka,Phub Zam								
Result Analyzed By				Dorji Wangchuk,Kuenzang Dorji,Sonam Gyeltshen								

Verified By : Binay Thapa
Section Head, Virology and Molecular Lab, RCDC

Printed By : *jib*

Example of COVID-19 testing report, generate & verify by volunteer to focal person

དཔལ་ལྡན་འབྲུག་གཞུང་། གསོ་བ་ལྡན་ཁག། འབྲུག་ ཐིམ་ཕུ།
ROYAL GOVERNMENT OF BHUTAN, MINISTRY OF HEALTH
THIMPHU: BHUTAN – 11001

Date: 2021-03-09

TO WHOM IT MAY CONCERN

This is to certify that ~~Sangay Dorji~~ Age/Sex: 31.00/Male holder of CID/Passport No: ~~11509000094~~ has been tested for COVID-19 by RT-PCR on the above date and found to be **Negative** at the time of testing

The individual has also been examined by a competent Physician and was free of any signs and symptoms at the time of examination. He/she has been deemed **fit to travel/fly**

Name of Doctor : Dr. Tshokey
BMHC Registration No : MM-079

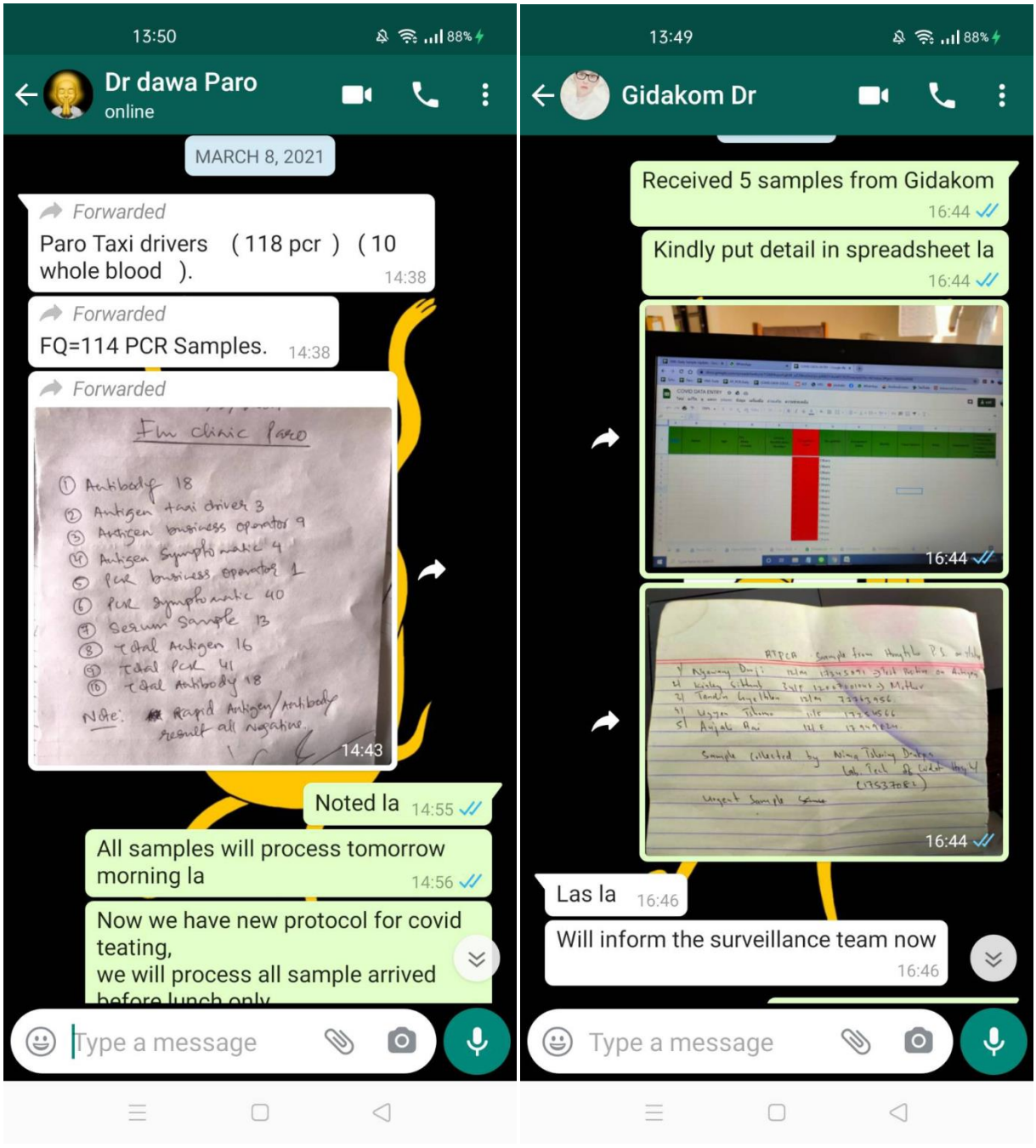
RT-PCR REPORT FOR COVID-19

Test Center	*Royal Centre for Disease Control*		
Specimen ID	*JB1216*	CID/Passport	~~11509000094~~
Name	*Sangay Dorji*	Age/Gender	*31.00/Male*
Occupation	*Driver*		
Collected By	*Royal Centre for Disease Control*	Collected From	*Facility Quarantine(Hotel Ariya)*
Sample Type	*Nasopharyngeal Swab*	Product/Kit Used	*SD Biosensor*
PCR Platform	*7500 Fast Dx*	Collection Date	*2021-03-09*
Test Performed On	*2021-03-09*	PCR Result	*Negative*
Test Performed By	*Tshewang Dorji,Nima,Pema Chophel,Tshering Pelki,Dechen Wangmo*		
Result Analyzed By	*Dorji Wangchuk,Kuenzang Dorji,Sonam Gyeltshen*		
Contact Details	*Royal Centre for Disease Control, bthapa@health.gov.bt, +975-17562422*		

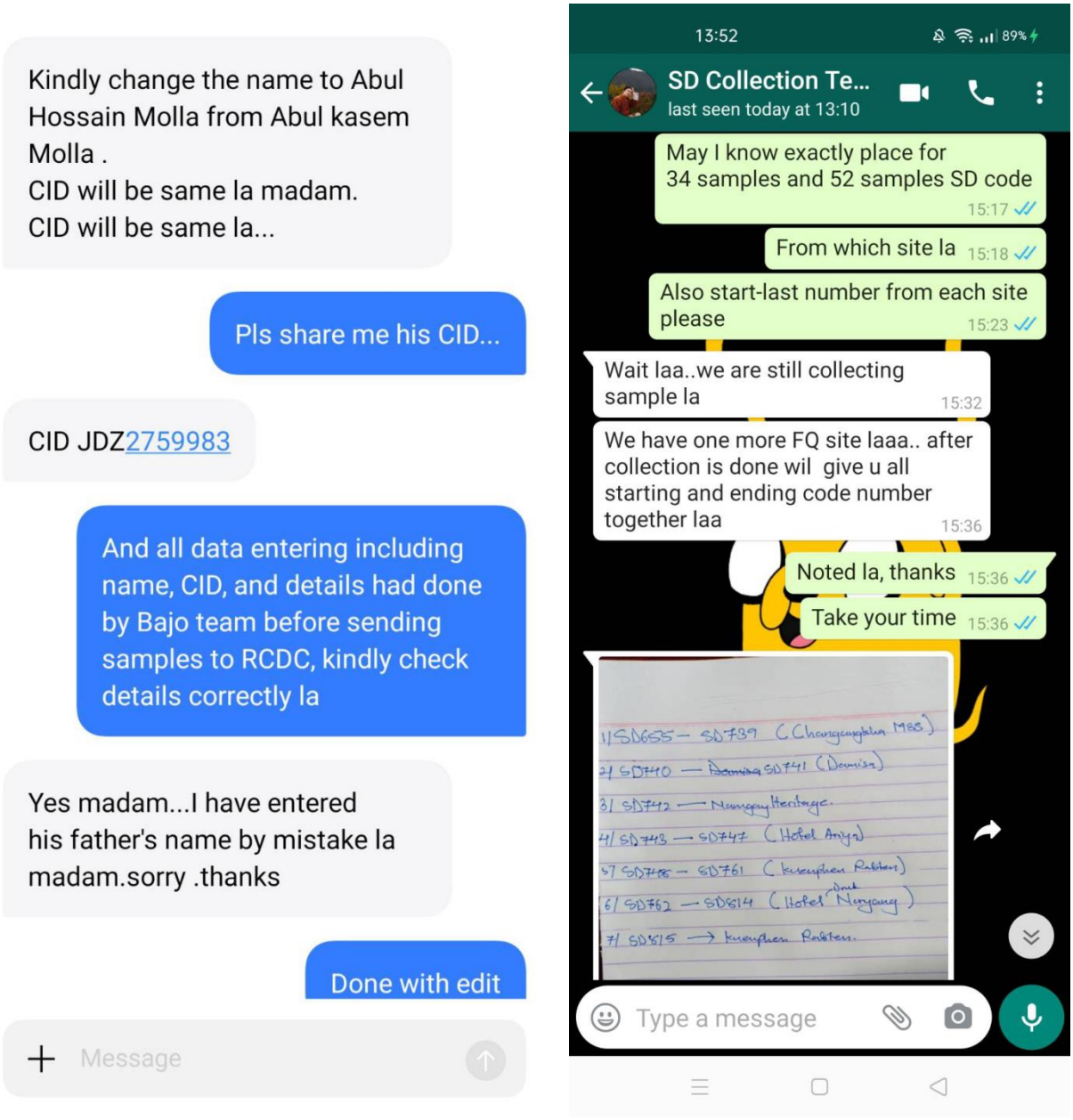
Verified By : Binay Thapa
Section Head, Virology and Molecular Lab
Royal Centre for Disease Control
Printed By : *jib* on *2021-03-09*

PABX: 975-2-322602,322351,328091,328092,328093 | www.health.gov.bt

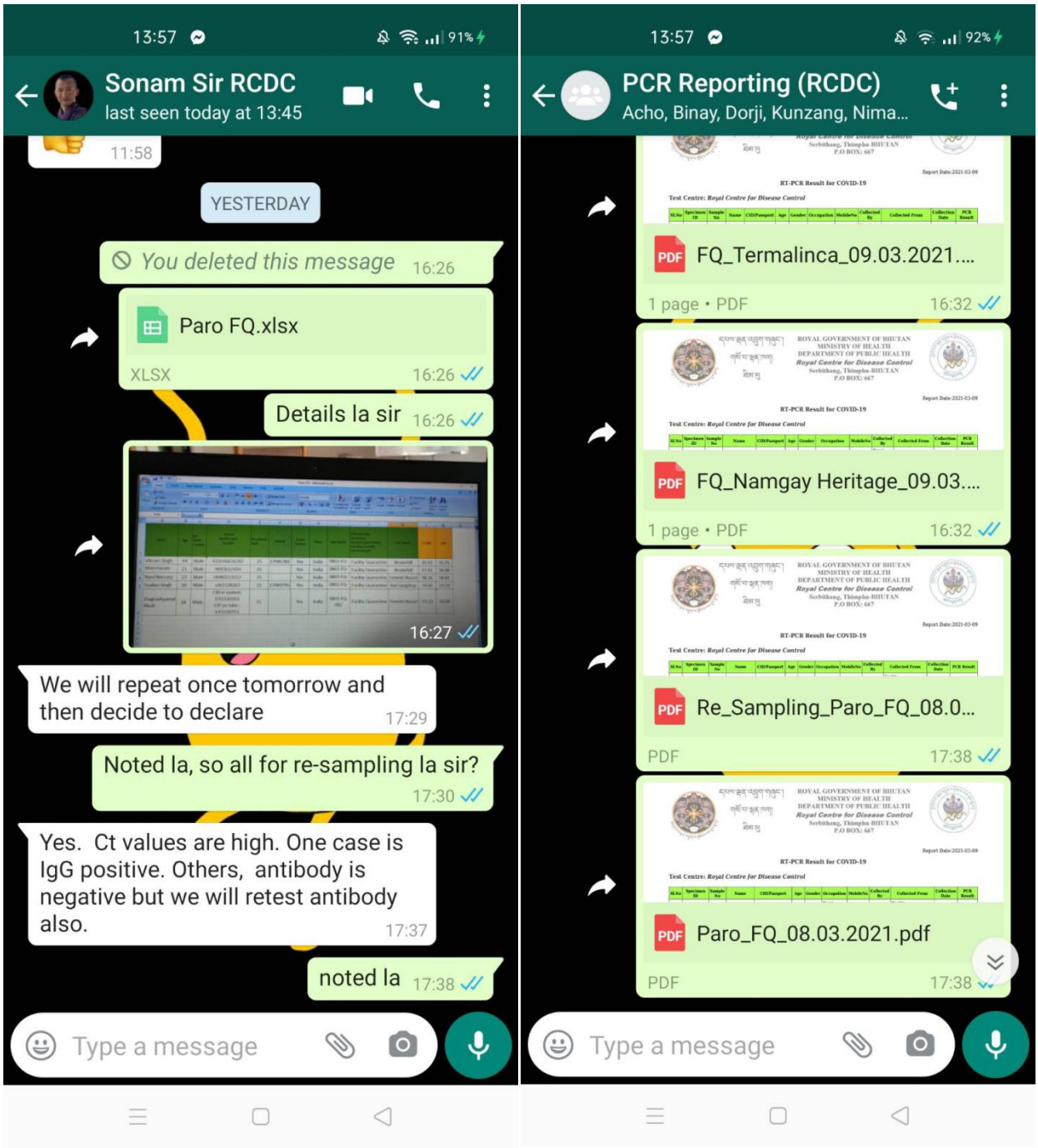
Example of COVID-19 travel certificate for traveler, generated & verified and issued by volunteer



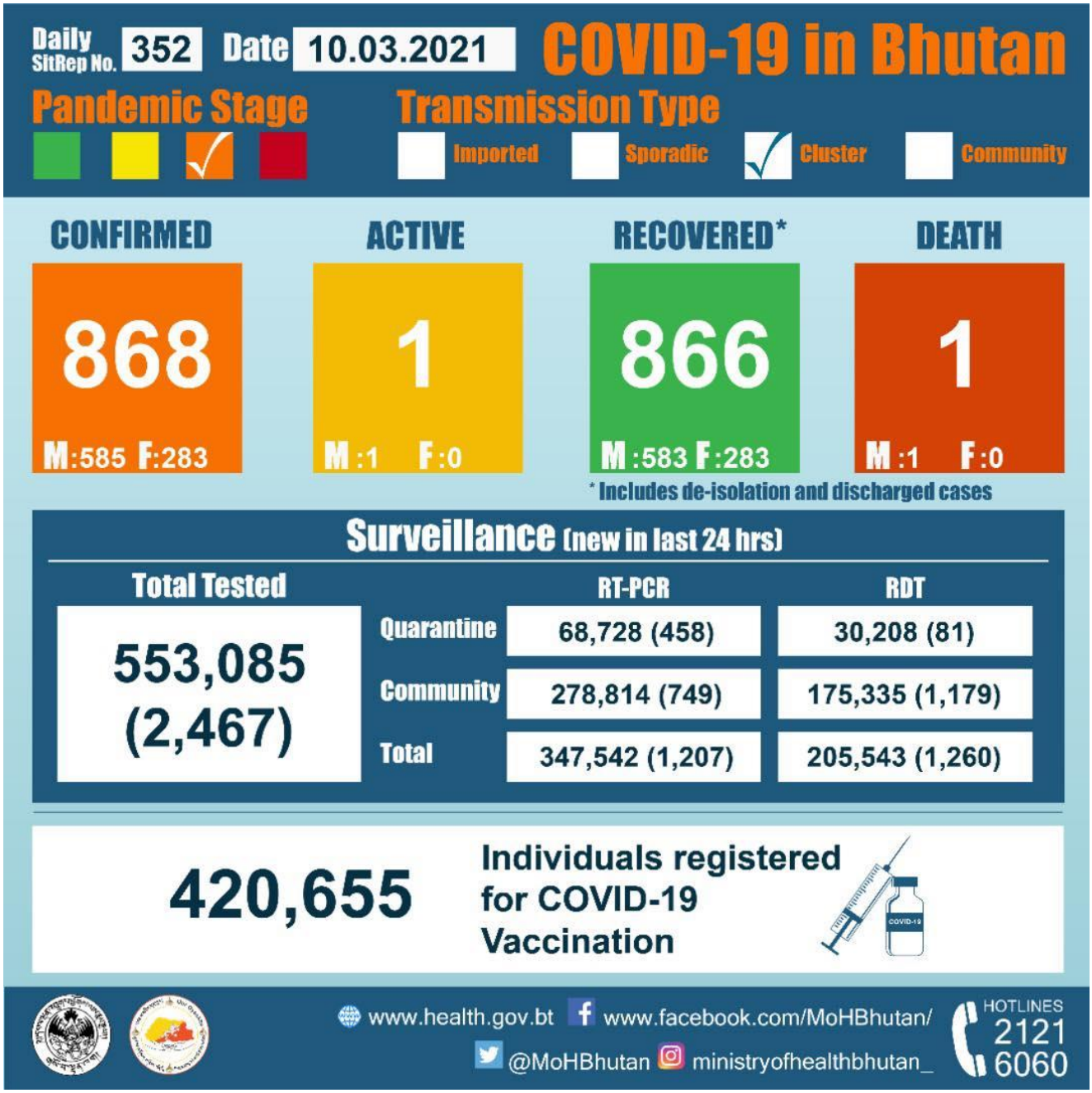
Example of coordinating with districts hospital doctor about COVID-19 samples details



Example of coordinating with districts hospital doctor and sample collection team about COVID-19 samples details and data problem



Daily discussion about testing result and reporting to Dr.Sonam Wangchuk, RCDC specialist and Bhutan COVID-19 taskforce member



Example dashboard updated by Ministry of Health for COVID-19 update, including RT-PCR daily summary test which updated by volunteer

APPENDIX

OTHERS ACTIVITIES

5S Implementation day for RCSC building, staffs were helping each others to made parking lines.

Attended cleaning day for garden trimmings in the gardens surrounding the RCDC building


Attended SOPs development with VML team, Phunakha, November 2019


Observed Bhutanese traditional weaving the fabric at Royal textile museum

Gathered with Canadian & Japanese volunteers to exchange knowledge and experiences

Trek & picnic with Bhutanese friends to relax and also learn about surrounded area, Bhutan histories and Bhutan cultures

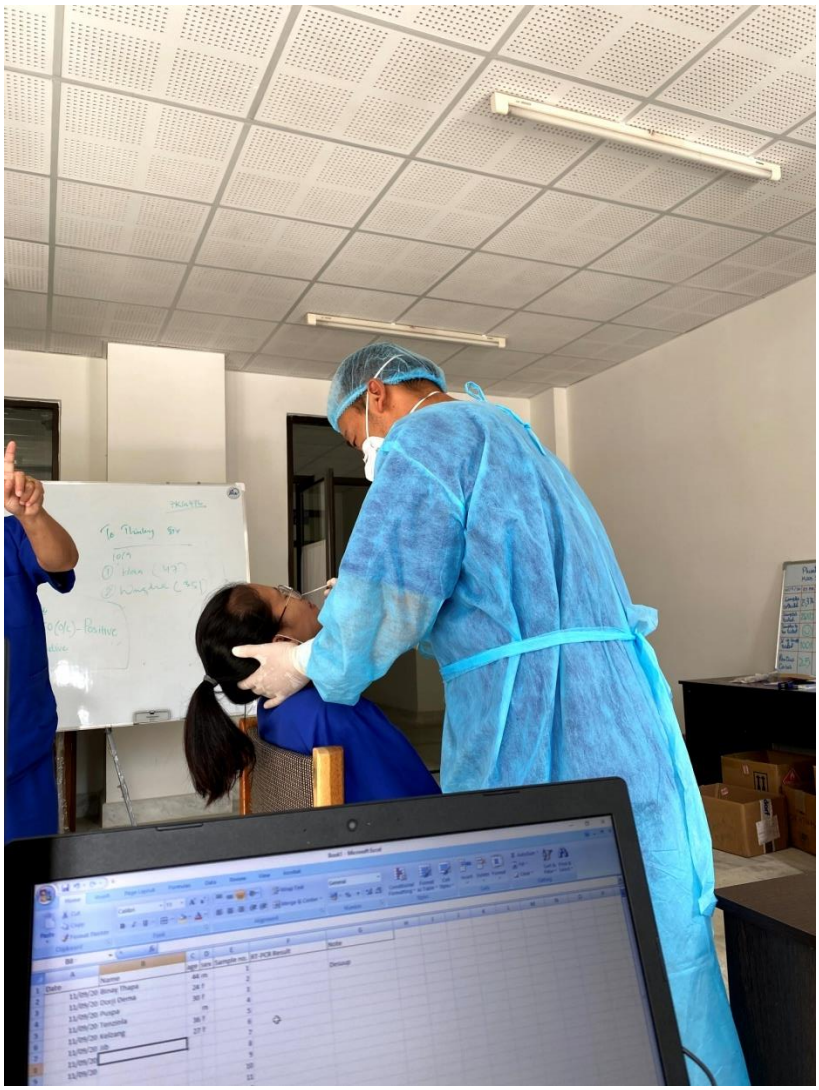
Meeting with Thai Consulate to briefed about COVID-19

Stayed with local home stay to learn and exchange culture

Visit Lyonpo (Minister) of Ministry of Health, Royal Government of Bhutan

Visit the Director of RCSC of Ministry of Human Resource, Royal Government of Bhutan

RCSC Director, Ministry of Human Resource, Royal Government of Bhutan visit volunteer at RCDC to give gifts for serving on COVID-19 duty



Volunteer as front-liner in COVID-19 testing, got COVID-19 test every 14 days by swab test for RT-PCR to monitor and control the disease within testing center

บทสรุปสำหรับผู้บริหารสำหรับรายงานฉบับสมบูรณ์
โครงการอาสาสมัครเพื่อนไทย ปฏิบัติงาน ณ ราชอาณาจักรภูฏาน

ชื่ออาสาสมัคร: นางสาวมัชฌิมาพร ส่องแสง

หน่วยงานที่สังกัด: ห้องปฏิบัติการทดสอบไวรัสและชีวโมเลกุล ศูนย์ควบคุมโรค กระทรวงสาธารณะสุข (Virology & Molecular Laboratory, Royal Centre for Disease Control, Ministry of Health, Royal Government of Bhutan)

ตำแหน่ง: นักวิทยาศาสตร์ปฏิบัติการ

รายละเอียดงาน

1. เข้าร่วมเป็นส่วนหนึ่งของโครงการสำรวจไข้หวัดใหญ่ในประเทศภูฏาน
2. ก่อตั้งระบบ 5ส เพื่อจัดการความสะอาดเรียบร้อยภายในห้องปฏิบัติการ
3. จัดตั้งระบบการควบคุม การบันทึกข้อมูล รวมทั้งการรับ-จ่าย สารเคมีและอุปกรณ์และเครื่องมือที่ใช้ในการทดสอบในห้องปฏิบัติการพร้อมฝึกอบรม
4. จัดตั้งระบบการสอบเทียบภายในของเครื่องมือและอุกปรณ์ภายในห้องปฏิบัติการ พร้อมฝึกอบรมพนักงาน
5. จัดตั้งระบบการควมคุมเอกสารภายในห้องปฏิบัติการพร้อมอบรมพนักงาน
6. ดำเนินการเพาะเลี้ยงเซล์เพื่อเพาะเลี้ยงไวรัสไข้หวัดใหญ่ ภายใต้โครงการสำรวจไข้หวัดใหญ่ในประเทศภูฏาน
7. เข้าร่วมทีมในการเป็นด่านหน้าของศูนย์ทดสอบไวรัสโควิด-19 ณ ศูนย์การทดสอบแห่งชาติ กรมควบคุมโรค

ภาพรวมและสรุปผลการปฏิบัติงาน

1. เข้าร่วมเป็นส่วนหนึ่งของโครงการสำรวจไข้หวัดใหญ่ในประเทศภูฏาน

ห้องปฏิบัติการทดสอบไวรัสและชีวโมเลกุลซึ่งอาสาสมัครไปประจำอยู่ ดำเนินครงการหลักคือการสำรวจไข้หวัดใหญ่ในประเทศภูฏาน โดยร่วมมือกับองค์กรอนามัยโลกและศูนย์ควบคุมโรคของสหรัฐอเมริกาในการสำรวจและทดสอบตัวอย่างไข้หวัดใหญ่โดยวิธีการ RT-PCR เพื่อเก็บข้อมูลของไวรัสที่ก่อไข้หวัดใหญ่ภายในประเทศและส่งข้อมูลและตัวอย่างไปยังองค์การอนามัยโลก โดยมี 11 โรงพยาบาลทั่วประเทศเข้าร่วมโครงการ ทางห้องปฏิบัติการทำหน้าที่เป็นศูนย์หลักในการฝึกอบรมพนักงาน ณ โรงพยาบาลที่เข้าร่วมโครงการในการเก็บตัวอย่างและการส่งตัวอย่าง และทำหน้าที่ในการตรวจหาเชื้อไวรัสโดยวิธีทางชีวโมเลกุล เนื่องด้วยจำนวนพนักงานในห้องปฏิบัติการไม่เพียงพอ ทางห้องปฏิบัติการจึงได้ส่งคำขอไปยัง TICA และได้รับอาสาสมัครมาเข้าร่วมโครงการนี้และกิจกรรมอื่นๆ ซึ่งอาสาสมัครได้เข้าร่วมทั้งกิจกรรมการอบรม การให้คำแนะนำแก่โรงพยาบาลและการทดสอบทางชีวิโมเลกุลจากตัวอย่างที่ถูกส่งมาจากโรงพยาบาลต่างๆ เป็นเวลา 4 เดือน โดยเริ่มตั้งแต่เดือนพฤศจิกายน 2562 ถึงเดือนกุมภาพันธ์ 2563 ทางโครงการได้หยุดชะงักเนื่องจากการระบาดของโควิด-19 ในระยะเวลา 4 เดือน ทางห้องปฏิบัติการได้ทดสอบตัวอย่างไข้หวัดใหญ่ไปทั้งสิ้น 890 ตัวอย่าง พบว่า 53 ตัวอย่างมีผลเป็นบวกในการทดสอบไข้หวัดใหญ่ 36 ตัวอย่างเป็นไข้หวัดใหญ่สายพันธุ์ A และ 17 ตัวอย่างเป็นไข้หวัดใหญ่สายพันธุ์ B

โดยโครงการสำรวจไข้หวัดใหญ่ของทางห้องปฏิบัติการ เริ่มขึ้นตั้งแต่ปีคริสต์ศักราช 2016 ประสบความสำเร็จในการเก็บข้อมูลไข้หวัดใหญ่ที่ระบาดอยู่ในประเทศ และส่งข้อมูลให้องค์การอยามัยโลกและได้มีส่วนผลักดันให้ประชาชนชาวภูฏานได้รับวัคซีนไข้หวัดใหญ่ของสายพันธุ์ที่ระบาดในประเทศ โดยมีการเริ่มฉีดวัคซีนในปี 2019และทางห้องปฏิบัติการมีแผนจะขยายโครงการและเพิ่มกำลังการตรวจ โดยมีแผนพัฒนาห้องปฏิบัติการทดสอบไวรัสโดยจะมีการยื่นขอใบรับรองการเป็น National Influenza Centre ของประเทศภูฏานผ่านองค์การอนามัยโลกในปีคริสต์ศักราช 2021 -2022

2. ก่อตั้งระบบ 5ส เพื่อจัดการความสะอาดเรียบร้อยภายในห้องปฏิบัติการ

ห้องปฏิบัติการได้รับการสนับสนุนสารเคมี อุปกรณ์ และเครื่องมือในการทดสอบมากมาย แต่ขาดการจัดเก็บที่ดี รวมทั้งการทำความสะอาด การแบ่งสัดส่วน ทางอาสาสมัครได้รับคำร้องขอจากหัวหน้าห้องปฏิบัติการให้จัดทำมาตรฐาน 5ส ที่เคยทำในประเทศไทยมาประยุกต์ใช้ในห้องปฏิบัติการ เช่น การแบ่งโซน การติดฉลากระบุพื้นที่ในการทำงาน การจัดเก็บอุปกรณ์ต่างๆให้เข้าที่และการรักษาความสะอาดของห้องปฏิบัติการอย่างสม่ำเสมอ โดยอาสาสมัครได้เสนอแผนงานและร่วมกับเจ้าหน้าที่ในห้องปฏิบัติจัดทำ 5ส ขึ้น ทำให้การจัดการเป็นระบบระเบียบ ซึ่ง 5ส นับว่าเป็นเรื่องพื้นฐานในการจัดการที่ดีของห้องปฏิบัติการ หรือ Good laboratory practice อีกด้วย ระบบ 5ส ที่อาสาสมัครได้จัดทำขึ้น ยังคงถูกนำมาใช้ในการจัดการต่างๆในห้องปฏิบัติการอย่างต่อเนื่องและได้ผลดีอีกด้วย

3. จัดตั้งระบบการควบคุม การบันทึกข้อมูล รวมทั้งการรับ-จ่าย สารเคมีและอุปกรณ์และเครื่องมือที่ใช้ในการทดสอบในห้องปฏิบัติการพร้อมฝึกอบรม

สืบเนื่องมาจากโครงการสำรวจไข้หวัดใหญ่ของห้องปฏิบัติการ โครงการนี้ได้รับการสนับสนุนเงินทุน อุปกรณ์ สารเคมี และของใช้จำเป็นโดยองค์กรอนามัยโลกและศูนย์ควบคุมโรคของสหรัฐอเมริกา โดยอุปกรณ์และสารเคมีจะถูกส่งมาที่ห้องปฏิบัติการอย่างต่อเนื่องเนื่องจากมีการเขียนคำขอโดยปราศจากการตรวจเช็คจำนวนในคลัง เลยทำให้บางรายการมีของตกค้างจำนวนมากเนื่องด้วยพนักงานขาดความรู้และประสบการณ์ด้านการจัดการ จึงทำให้สารเคมี อุปกรณ์ที่รับเข้ามาจำนวนมากมีการหมดอายุ การจัดเก็บที่ไม่เหมาะสม และมีระบบการควมคุมอุปกรณ์และสารเคมี อาสาสมัครได้ทำการสำรวจรายการของอุปกรณ์และสารเคมี ซึ่งมากกว่า 350 รายการรวมทั้งเครื่องมือที่ใช้ในห้องปฏิบัติการที่มีมากกว่า 70 รายการ และทำระบบบันทึกข้อมูลทั้งหมด เช่น ชื่อรายการสารเคมี วันที่รับเข้า ลอตที่ผลิต บริษัทที่ผลิต วันผลิตและวันหมดอายุ รวมทั้งจำนวน ตารางการเบิกจ่าย โดยใช้โปรแกรมพื้นฐาน Excel สำหรับการบันทึกและง่ายต่อ

การใช้งาน และมีการอัพเดทรายการทุกครั้งที่รับเข้า-จ่ายออก และทำรายการสรุปประจำเดือน สำหรับเครื่องมือและอุปกรณ์ในห้องปฏิบัติการก็เช่นกัน โดยกระบวนการทั้งหมดถูกสังเกตุการโดย Pema Yuden เจ้าหน้าที่ห้องปฏิบัติการอาวุโสซึ่งเป็นเจ้าหน้าที่ที่ดูแลคลังเก็บอุปกรณ์และสารเคมี หลังจากจัดตั้งระบบการจัดการอุปกรณ์ สารเคมี และเครื่องมือในห้องปฏิบัติการขึ้น ได้มีการเริ่มใช้จริงในเดือนธันวาคม 2562 และมีการอบรมวิธีการควบคุม การใช้งานนให้แก่พนักงานทุกคนในห้องปฏิบัติการ

ระบบการจัดการอุปกรณ์และสารเคมีที่ได้จัดทำขึ้นนี้ เป็นประโยชน์อย่างยิ่งเมื่อเกิดการระบาดของไวรัสโคโรน่าสายพันธุ์ใหม่ซึ่งห้องปฏิบัติการต้องรับเข้าและจัดการสารเคมีและอุปกรณ์ในการตรวจมากกว่า 50 รายการเพื่อรองรับการตรวจมากกว่า 500,000 ตัวอย่างในเวลาต่อมา ซึ่งในบางช่วงของการระบาดต้องรายงานจำนวนคงคลังไปยังกระทรวงการสาธารณะสุขอย่างเร่งด่วนเพื่อใช้ในการประเมินศักยภาพในการตรวจของห้องปฏิบัติการและกำหนดกลยุทธ์ในการรับมือกับโควิด-19 อย่างทันท่วงที โดยอาสาสมัครรับหน้าที่ในการรายงานอุปกรณ์และสารเคมีคงคลังต่อผู้เกี่ยวข้องเป็นรายเดือนและรายงานเมื่อมีผู้ยื่นคำขอจากกระทรวงอีกด้วย โดยหลังจากอาสาสมัครได้กลับประเทศ ได้ปรึกษากับหัวหน้าห้องปฏิบัติการและมอบหมายให้ Tshering Pelkiเจ้าหน้าที่ห้องปฏิบัติการอาวุโสในการดูแลคลังในการตรวจโควิด-19 ไปจนกว่าการระบาดจะจบสิ้น

4. จัดตั้งระบบการสอบเทียบภายในของเครื่องมือและอุกปรณ์ภายในห้องปฏิบัติการ พร้อมฝึกอบรมพนักงาน

หลังจากมีการทำรายการและจัดตั้งระบบการควบคุมอุปกรณ์แบะเครื่องมือภายในห้องปฏิบัติการและได้เริ่มใช้งานจริง จากการประชุมและปรึกษากับเจ้าพนักงาน พบว่าเครื่องมือส่วนใหญ่ไม่มีการสอบเทียบเลยตั้งแต่มีการติดตั้ง เนื่องจากภูฏานไม่มีห้องปฏิบัติการในการสอบเทียบภายในประเทศ การสอบเทียบแต่ละครั้งจึงต้องจ้างวิศวกรมาจากต่างประเทศเช่นอินเดีย

และไทย ซึ่งทางห้องปฏิบัติการต้องรับผิดชอบค่าใช้จ่ายในการสอบเทียบ รวมทั้งค่าเดินทาง ค่าใช้จ่ายของวิศวกรที่จะมาสอบเทียบด้วย ทางห้องปฏิบัติการจึงจัดหารวิศวกรมาสอบเทียบเครื่องมือที่มีความสำคัญมากที่สุดเป็นอันดับแรกซึ่งก็คือเครื่องตรวจ RT-PCR เท่านั้น โดยมีความถี่ปีละ 1 ครั้ง

เครื่องมือและอุปกรณ์อื่นๆก็นับว่ามีความสำคัญที่จะส่งผลต่อประสิทธิภาพการทดสอบ โดยมีมาตรฐาน วิธีการและความถี่ในการสอบเทียบแตกต่างกันไป ซึ่งด้วยเหตุผลนี้ อาสาสมัครซึ่งมีประสบการทำงานในด้วนการควบคุมคุณภาพมาก่อน เลยจัดทำคู่มือการสอบเทียบที่สาสมารถดำเนินการได้ภายในห้องปฏิบัติการเอง จัดทำแผนการสอบเทียบและจัดอบรมให้แก่พนักงานอย่างน้อยเพื่อเป็นการยืนยันประสิทธิภาพของเครื่องมือและอุปกรณ์จนกว่าทางห้องปฏิบัติการจะมีศักยภาพในการจัดหาหน่วยงานมาสอบเทียบจากต่างประเทศได้ และการสอบเทียบภายในเริ่มใช้งานจริงในเดือนพฤศจิกายน 2563

5. จัดตั้งระบบการควมคุมเอกสารภายในห้องปฏิบัติการพร้อมอบรมพนักงาน

นอกเหนือจากโครงการสำรวจไข้หวัดใหญ่ในภูฏานซึ่งเป็นงานหลักของห้องปฏิบัติการ ทางห้องปฏิบัติการยังให้บริการในการตรวจหาไวรัสชนิดต่างๆเพื่อยืนยันตัวอย่างโรคที่ต้องสงสัยว่าเกิดจากไวรัส เช่น ไข้หวัดธรรมดา ไข้เลือดออก โรคหัด โรคมือเท้าปาก เป็นต้น ซึ่งการทดสอบที่มีหลายขั้นตอนและหลายรายการ ทางห้องปฏิบัติการมีการจัดทำคู่มือในการทดสอบต่างๆ รวมทั้งการจัดทำฟอร์มในการบันทึกการทดสอบอีกด้วย จากการสำรวจเอกสารต่างๆ พบว่าไม่มีการจัดเก็บเอกสารอย่างเป็นระบบ มีเพียงการบันทึกไฟล์ต่างๆไว้ในแชร์ไฟล์เท่านั้น อาสาสมัครซึ่งมีประสบการในการจัดการเอกสาร ISO:1900 จึงนำมาตรฐานการจัดการเอกสารเข้ามาใช้ในการจัดการ/จัดเก็บเอกสารในห้องปฏิบัติการอย่างมีมาตรฐานและมีระบบ มีการบันทึกรายการเอกสารขึ้นทะเบียนเอกสารเก่าย้อนหลังทั้งหมด มีการรีวิวเอกสารและแก้ไขให้สอดคล้องกับการทำงานในปัจจุบันรวมทั้งขึ้นทะเบียนเอกสารที่มีการจัดทำขึ้นมาใหม่อีกด้วย และมีการรอบรมพนักงาน

โดยเฉพาะ Dorji Wangchuk ซึ่งเป็นเจ้าอ้าที่อาวุโสที่ดูแลระบบคุณภาพและเอกสารภายในห้องปฏิบัติการ ระบบจัดการเอกสารที่ดีนี้ถูกนำไปตอบข้อเสนอแนะด้านการจัดการเอกสาร จากการประเมินการเป็น National Influenza Centreซึ่งกล่าวมาในข้อ 1 อีกด้วย และหากห้องปฏิบัติการดำเนินการควบคุมเอกสารอย่างต่อเนื่อง จะส่งผลดีในแผนการขอใบรับรองคุณภาพห้องปฏิบัติการที่จะเกิดขึ้นในอนาคต โดยเฉพาะระบบคุณภาพ ISO:17025

6. ดำเนินการเพาะเลี้ยงเซล์เพื่อเพาะเลี้ยงไวรัสไข้หวัดใหญ่ ภายใต้โครงการสำรวจไข้หวัดใหญ่ในประเทศภูฏาน

โครงการเพาะเลี้ยงเซลล์เพื่อเพาะเลี้ยงไวรัสไข้หวัดใหญ่ เป็นโครงการเสริมสืบเนื่องมาจากโครงการสำรวจไข้หวัดใหญ่ (รายละเอียดดังหัวข้อที่ 1) หลังจากองค์การอนามัยโลกและกรมควบคุมโรคสหรัฐอเมริกาได้ร่วมทุนและร่วมมือในการสำรวจได้หวัดใหญ่และเก็บข้อมูลเป็นรายปีแล้ว ทางองค์กรดังกล่าวยังต้องการตัวอย่างของไวรัสที่ก่อไข้หวัดใหญ่เพื่อนำไปทำการศึกษาและวิจัยด้านวัคซีนไข้หวัดใหญ่ต่อไป ดังนั้น ห้องปฏิบัติการต้องส่งตัวอย่างไวรัสไปที่ศูนย์วิจัยทางการแพทย์ทหาร หน่วยงาน AFRIMS ซึ่งเป็นหน่วยงานย่อยของกรมควบคุมโรคสหรัฐอเมริกาซึ่งตั้งอยู่ที่ประเทศไทย โดยทาง AFRIMS เป็นหน่วยงานที่สนับสนุนด้านการเพาะเลี้ยงเซลล์ไม่ว่าจะเป็นด้านการอบรมให้ความรู้บุคคลากรและสนับสนุนงบประมาณ การจัดหาเซลล์ต้นแบบ และอุปกรณ์สารเคมีต่างๆมายังห้องปฏิบัติการมีการอีกด้วย โดยบุคลากรที่ได้รับการอบรมคือ Dorji Wangchuk และ KunzangDorji

ทางห้องปฏิบัติการได้เริ่มเพาะเลี้ยงเซลล์ในปี 2018 แต่ไม่ประสบความสำเร็จมากนัก เพราะระยะเวลาในการเพาะเลี้ยงขั้นต่ำ 30 วันและต้องดูแลและสังเกตุการทุกวัน เนื่องจากการจัดสรรเวลาของพนักงานเป็นไปได้ยากเพราะต้องทำกิจกรรมอื่นควบคู่ไปด้วย ทางห้องปฏิบัติการจึงร้องขออาสาสมัครเข้ามาช่วยในหน้าที่นี้ด้วย โดยอาสาสมัครได้เริ่มทำการสำรวจอุปกรณ์ สารเคมีอาหารเลี้ยงเซลล์และเซลล์ต้อนแบบ และเริ่มทำการเพาะเลี้ยงครั้งที่ 1 เมื่อเดือนกุมภาพันธ์ 2563

แต่ไม่ประสบความสำเร็จ หลังวิเคราะห์ปัญหาและสาเหตุร่วมกับพนักงาน ที่ร่วมทำการทดลอง Dorji Wangchuk พบว่าเซลล์เจริญเติบโตน้อยมากและไม่เป็นที่น่าพอใจ เนื่องจากเซลล์ต้นแบบที่ถูกส่งมาจาก AFRIMS ตั้งแต่ปี 2562 ถูกทำลายเนื่องจากอุณหภูมิจัดเก็บไม่เหมาะสมเพราะตู้แช่แข็งหยุดทำงานไปหลายครั้งเนื่องจากไฟดับ และอีกประการคืออาหารเลี้ยงเซลล์และสารเคมีต่างๆ หมดอายุ เพราะมีอายุการจัดเก็บที่สั้นมาก ซึ่งอาจจะเป็นอีกปัจจัยที่ทำให้เซลล์ไม่เจริญเติบโตเท่าที่ควร หลังจากได้วิเคราะห์ปัญหาที่เกิดขึ้นแล้ว อาสาสมัครและพนักงานได้จัดทำรายการอุปกรณ์และสารเคมีและเซลล์แม่แบบลอตใหม่ที่ยังมีประสิทธิภาพดีและยังไม่หมดอายุและยื่นขอไปยัง AFRIMS เพื่อให้ส่งมายังห้องปฏิบัติการเพื่อการเพาะเลี้ยงเซลล์ในครั้งถัดไป แต่เนื่องจากสถานการณ์โควิด-19ทางห้องปฏิบัติการเป็นศูนย์กลางการทดสอบไวรัส จึงเลื่อนการจัดสรรเวลาสำหรับการเพาะเลี้ยงเซลล์และเพาะเลี้ยงไวรัสไข้หวัดใหญ่ออกไปอย่างไม่มีกำหนด

7. เข้าร่วมทีมในการเป็นด่านหน้าของศูนย์ทดสอบไวรัสโควิด-19 ณ ศูนย์การทดสอบแห่งชาติ กรมควบคุมโรค

ห้องปฏิบัติการทดสอบไวรัสและชีวโมเลกุลที่อาสาสมัครประจำอยู่ เป็นห้องปฏิบัติการเดียวในภูฏานที่สามารถทดสอบสาร RNA ของไวรัสได้ ในเดือนมีนาคม 2563 เกิดการระบาดของโควิด-19 ไปทั่วโลก ซึ่งภูฏานก็ได้รับผลกระทบเช่นกัน ทำให้ห้องปฏิบัติการที่อาสาสมัครทำงานอยู่กลายเป็นศูนย์ทดสอบโควิด-19 แห่งเดียวประจำภูฏานและก่อนที่มีการขยายห้องปฏิบัติการทดสอบโควิด-19 ไปยังเขตต่างๆเพิ่มอีก 5 แห่งในเวลาต่อมา อาสาสมัครได้เข้าร่วมทีมทดสอบในการสกัดหาสาร RNA และตรวจหาโควิด-19ในห้องปฏิบัติการจากตัวอย่างที่ถูกเก็บมาจากโรงพยาบาลต่างๆทั่วประเทศ รวมทั้งเป็นส่วนหนึ่งในการอบรมและดูแลพนักงานใหม่ที่เข้ามาช่วยเหลือห้องปฏิบัติการในการทดสอบโควิด-19 นอกเหนือจากนั้นยังได้รับหน้าที่ในการติดต่อประสานงานกับแพทย์ พยาบาล และทีมเก็บตัวอย่างทั้งในและต่างจังหวัดที่มีการส่งตัวอย่างเข้ามาทดสอบโควิด-19 อีกด้วย และในเวลาต่อมาได้รับมอบหมายให้จัดการข้อมูลและรายงานผลการทดสอบโควิด-19ประจำวันไปยังผู้ที่เกี่ยวข้อง โดยการปฏิบัติงานในศูนย์ทดสอบโควิด-19 ตั้งแต่

เดือนมีนาคม 2563 ถึงมีนาคา 2564 มีการทดสอบตัวอย่างโควิด-19 ไปทั้งสิ้นกว่า 400,000 ตัวอย่าง

ปัญหาและอุปสรรค / ข้อเสนอแนะ

ปัญหาและอุปสรรค	ข้อเสนอแนะ
1.การเพาะเลี้ยงเซลล์ที่ไม่บรรลุวัตถุประสงค์ เนื่องจากการเพาะเลี้ยงเซลล์ต้องใช้เวลานานและต้องมีการดูแลและเอาใจใส่อย่างใกล้ชิด รวมทั้งอาหารเลี้ยงเชื้อและสารเคมีที่ใช้มีอายุการจัดเก็บสั้น บุคลากรมีจำนวนไม่เพียงพอและเหตุสุดวิสัยการระบาดของโควิด-19 จึงไม่สาสมารถทำการทดลองในห้องปฏิบัติการต่อไปได้	แนะนำให้ทางห้องปฏิบัติการจัดสรรบุคลากรที่ทำหน้าที่เลี้ยงเซลล์โดยเฉพาะให้เกิดขึ้นจริง มีการจัดการงานอื่นที่คั่งค้างและวางแผนงานที่ชัดเจนก่อนเริ่มเพาะเลี้ยงเซลล์เพื่อให้การเพาะเลี้ยงเซลล์เป็นไปอย่างต่อเนื่องจนกระทั่งจบการบวนการ รวมทั้งมีการตรวจสอบอายุของอาหารเลี้ยงเซลล์และสารเคมีต่างๆเป็นระยะๆเพื่อให้มีประสิทธิภาพสูงสุด หากพบว่าเซลล์แม่แบบในลอตนั้นๆมีปัญหาให้แจ้งไปยัง AFRIMS และรับเซลล์ใหม่เข้ามาก่อนเริ่มเพาะเลี้ยงในแบชถัดไป
2.บุคลากรในห้องปฏิบัติการมีความรู้ ความสามารถเพียงพอในด้านวิชาการและการทำงานในห้องปฏิบัติการ มากกว่า 40 เปอร์เซนต์ของบุคคลกรได้รับการศึกษาระดับมหาบัณฑิต แต่หากขาดความรู้ความเข้าใจและความรอบคอบในการจัดการพื้นฐานที่เป็น good laboratory practice เช่น การขาดระบบจัดการเอกสาร ระบบจัดการอุปกรณ์และสารเคมีต่างๆ รวมทั้งเรื่องพื้นฐานอย่าง 5ส	อาสาสมัครได้ทำความเข้าใจและชี้ให้เห็นถึงความสำคัญของการจัดการพื้นฐานภายในห้องปฏิบัติการ และได้ริเริ่มจัดทำขึ้นบางส่วนเพื่อชี้ให้เห็นผลดีที่ตามมาจากระบบการจัดการที่ดีเหล่านี้ หากมีโอกาสในอนาคต อยากให้ TICA จัดอบรมโครงการที่เกี่ยวข้องกับการจัดการพื้นฐาต่างๆ ระบบคุณภาพ เช่น ISO 17025, ISO 9001ที่เกี่ยวข้องกับห้องปฏิบัติการทดสอบให้แก่พนักงานที่ปฏิบัติงานสายสุขภาพตามโรงพยาบาลที่มีห้องปฏิบัติการอยู่ทั่วทุกแห่งในประเทศเพื่อพัฒนาศักยภาพของบุคลากรที่ปฏิบัติงานในห้องปฏิบัติการทั่วประเทศ

3.การรับมือกับโควิด-19 ซึ่งเป็นเรื่องที่สำคัญและเป็นหน้าที่หลักของบุคลากรสายสุขภาพของประเทศ แต่ขาดการวางแผนงานและประสานงานที่ดี ขาดความรู้ความเข้าใจในการเก็บข้อมูลของผู้ปฏิบัติงานในพื้นที่ ทำให้บางครั้งเกิดปัญหาความล่าช้าและเกิดความผิดพลาดในการรายงานผลการทดสอบ และหลายครั้งการกรอกข้อมูลและการเก็บตัวอย่างมีความผิดพลาดเกิดขึ้นเนื่องจากบุคลากรขาดความใส่ใจขณะปฏิบัติหน้าที่ ขาด critical thinking ทำให้เกิดปัญหาและความยากลำบากในการทำงาน โดยเฉพาะอย่างยิ่งการทำงานกับหลายๆหน่วยงานจากหลายพื้นที่และเจ้าหน้าที่ที่มีพื้นฐานและศักยภาพที่แตกต่างกัน ซึ่งปัยหาเหล่านี้เกิดจากตัวบุคลากรเองและบุคลากรมีจำนวนน้อยมากเมื่อเทียบกับภาระหน้าที่ในการเก็บตัวอย่างและการลงพื้นที่เพื่อเก็บตัวอย่างและข้อมูล หลังจากทำงานอย่างหนักโดยไม่มีการหยุดพักเป็นเวลากว่า ปีในการปฏิบัติหน้าที่เกี่ยวกับโควิด-19 ความผิดพลาดเหล่านี้จึงเกิดขึ้นได้และเพิ่มขึ้นอย่างต่อเนื่อง	ทางกระทรวงการสาธารณะสุขของประเทศภูฏานควรจัดสรรบุคลากรและให้มีการหมุนเวียนผลัดเปลี่ยนเข้ามาทำหน้าที่ในการสำรวจ เก็บข้อมูลและเก็บตัวอย่างในการสำรวจโควิด-19 และมีการฝึกอบรมการจัดการตัวอย่างและข้อมูลที่ดีจากพื้นที่ก่อนส่งเข้ามาตรวจยังศูนย์ทดสอบของห้องปฏิบัติการ ในปัจจุบันและในอนาคตยังจะมีการสำรวจโควิด-19 เกิดขึ้นต่อไปในภูฏานอย่างไม่มีกำหนดจบ หากขาดแคลนบุคลากรต่อไปอาจจะเกิดปัญหางานล้นมือและประสิทธิภาพการทำงานไม่ดีเท่าที่ควร หากได้รับอาสาสมัครจากต่างประเทศเข้ามาช่วยเหลือในการเก็บตัวอย่าง เก็บข้อมูลและทดสอบตัวอย่างในห้องปฏิบัติการเพิ่มขึ้นก็อาจจะช่วยแก้ปัญหาในจุดนี้ได้

Summary report of working after returned to Thailand

Name: Miss MashchimapornSongsang

Position: Thai Volunteer, Laboratory Technologist

Work Place: Virology & Molecular Laboratory, Royal Centre for Disease Control, Ministry of Health Thimphu, Bhutan

Work Duration: 13th April 2021-26th April 2021

Preference

This report was proposed to summaries all work results and work achievement of Miss MashchimapornSongsang, Thai Volunteer in the position of Laboratory Technologist at Virology & Molecular Laboratory (VML), Royal Centre for Disease Control (RCDC), Ministry of Health Thimphu, Bhutan. Who had been continued the duties after returning to Thailand before end of the contract during 14th April 2021-26th April 2021

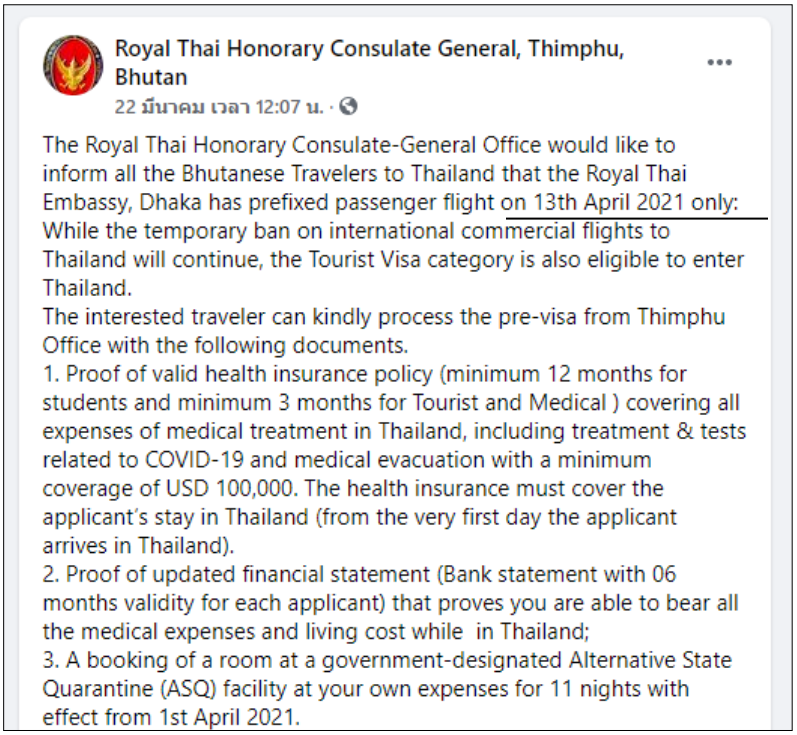
Since early 2020, the SAR-COV-2 Coronavirus (COVID-19) pandemic across the world, Bhutan also affected by virus. As per order of Royal Thai Embassy Dhaka, Bangladesh. Weekly flights from Bhutan to Bangkok have been suspended only 1 flight a month (for passenger), for this reason, volunteer have to return home 2 week earlier before end of contract, but still continue service to Bhutan National COVID-19 testing laboratory on data and reporting by online. This report contained detail and achievement of working in Thailand.

In behalf of a front-liner in Bhutan National COVID-19 testing laboratory, volunteer would like to thanks to Thailand International Cooperate Agency (TICA) for giving opportunities to support Bhutan in this short period especially 3rd lockdown started from 16th April 2021, this tasks could reduce workload of laboratory staffs in Thimphu.

Introduction

According to COVID-19 pandemic in Bhutan and volunteer has been worked in the Bhutan National COVID-19 testing laboratory for 17 months since the first confirmed case was detected in Thimphu, in 5th March 2020. For this reason, volunteer got contract extension for 6 months from October 2020 to April 2021.

The pandemic effects to every corner of the world, Bhutan also unexceptional, since less passengers than usual the airlines in Bhutan were suspended flights to Bangkok and Royal Thai Embassy Dhaka, Bangladesh are authorized to provide monthly flight schedule and certificate of entry (COE) for passenger to Thailand. Hence, volunteer had to return back on the 13th April 2021 flight (see order in below attachment)



Royal Thai Honorary Consulate General, Thimphu, Bhutan

22 มีนาคม เวลา 12:07 น. ·

The Royal Thai Honorary Consulate-General Office would like to inform all the Bhutanese Travelers to Thailand that the Royal Thai Embassy, Dhaka has prefixed passenger flight on 13th April 2021 only:
While the temporary ban on international commercial flights to Thailand will continue, the Tourist Visa category is also eligible to enter Thailand.
The interested traveler can kindly process the pre-visa from Thimphu Office with the following documents.
1. Proof of valid health insurance policy (minimum 12 months for students and minimum 3 months for Tourist and Medical) covering all expenses of medical treatment in Thailand, including treatment & tests related to COVID-19 and medical evacuation with a minimum coverage of USD 100,000. The health insurance must cover the applicant's stay in Thailand (from the very first day the applicant arrives in Thailand).
2. Proof of updated financial statement (Bank statement with 06 months validity for each applicant) that proves you are able to bear all the medical expenses and living cost while in Thailand;
3. A booking of a room at a government-designated Alternative State Quarantine (ASQ) facility at your own expenses for 11 nights with effect from 1st April 2021.

Release flight schedule for passenger from Royal Thai Honorary Consulate General, Thimphu, Bhutan

Work plan and agreement with chief of laboratory

Work plan after travelling back to Thailand before ending of contract

Volunteer name: Mashchimaporn Songsang

Work place: Virology & Molecular laboratory, Royal centre for disease control, Thimphu, Bhutan

For work period: 13th April to 26th April 2021 (Contract period 29th October 2019 to 26th April 2021)

Tasks: Work on data and reporting for COVID-19 testing

1. Data verification from JOT form and HFS system
2. Data cleaning and importing into COVID-19 system
3. Generate daily report for COVID-19 and send to RCDC specialist and focal doctors in district hospital
4. Co-ordinate with district in-charged and RCDC sample collection team about daily COVID-19 samples and line lists
5. Prepare daily summary for COVID-19 RT-PCR test

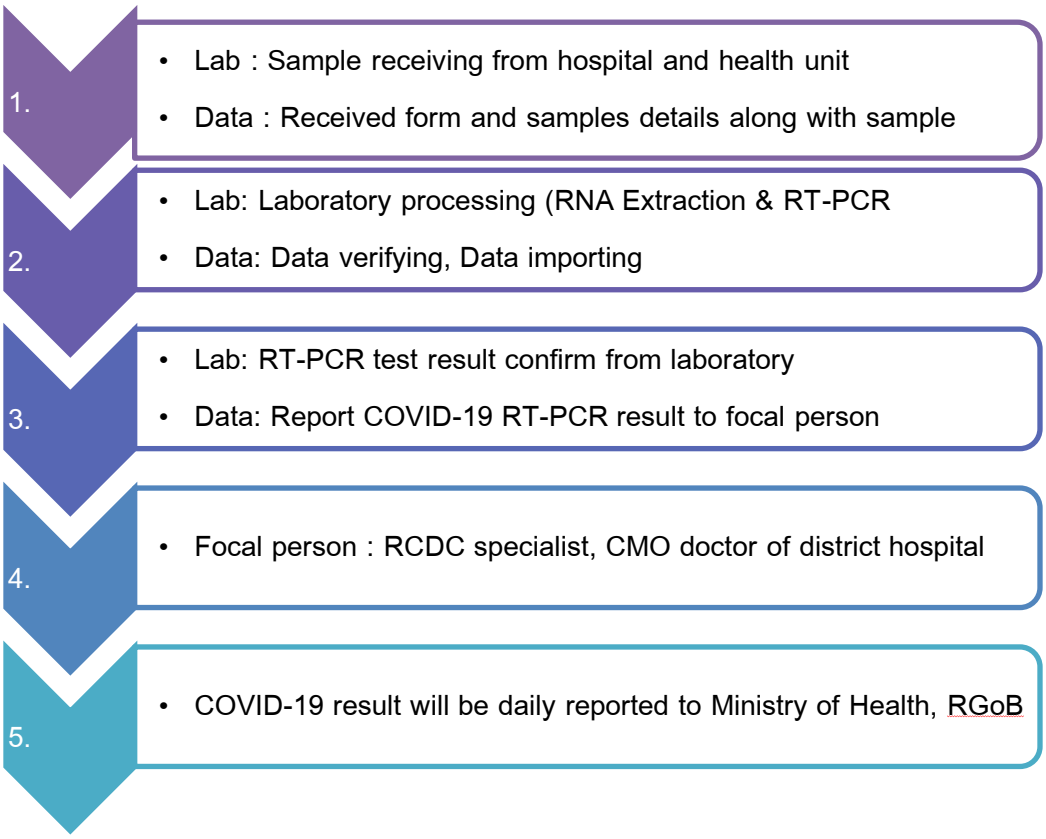
Mashchimaporn Songsang
(Thai Volunteer)

Binay Thapa
(Chief Laboratory Officer)

Objective and assignment

1. Data verification from JOT form and HFS system
2. Data cleaning and importing into COVID-19 system
3. Generate daily report for COVID-19 and send to RCDC specialist and focal doctors in district hospital
4. Co-ordinate with district in-charged and RCDC sample collection team about daily COVID-19 samples and line lists
5. Prepare daily summary for COVID-19 RT-PCR test

Work Flow of COVID-19 testing and reporting

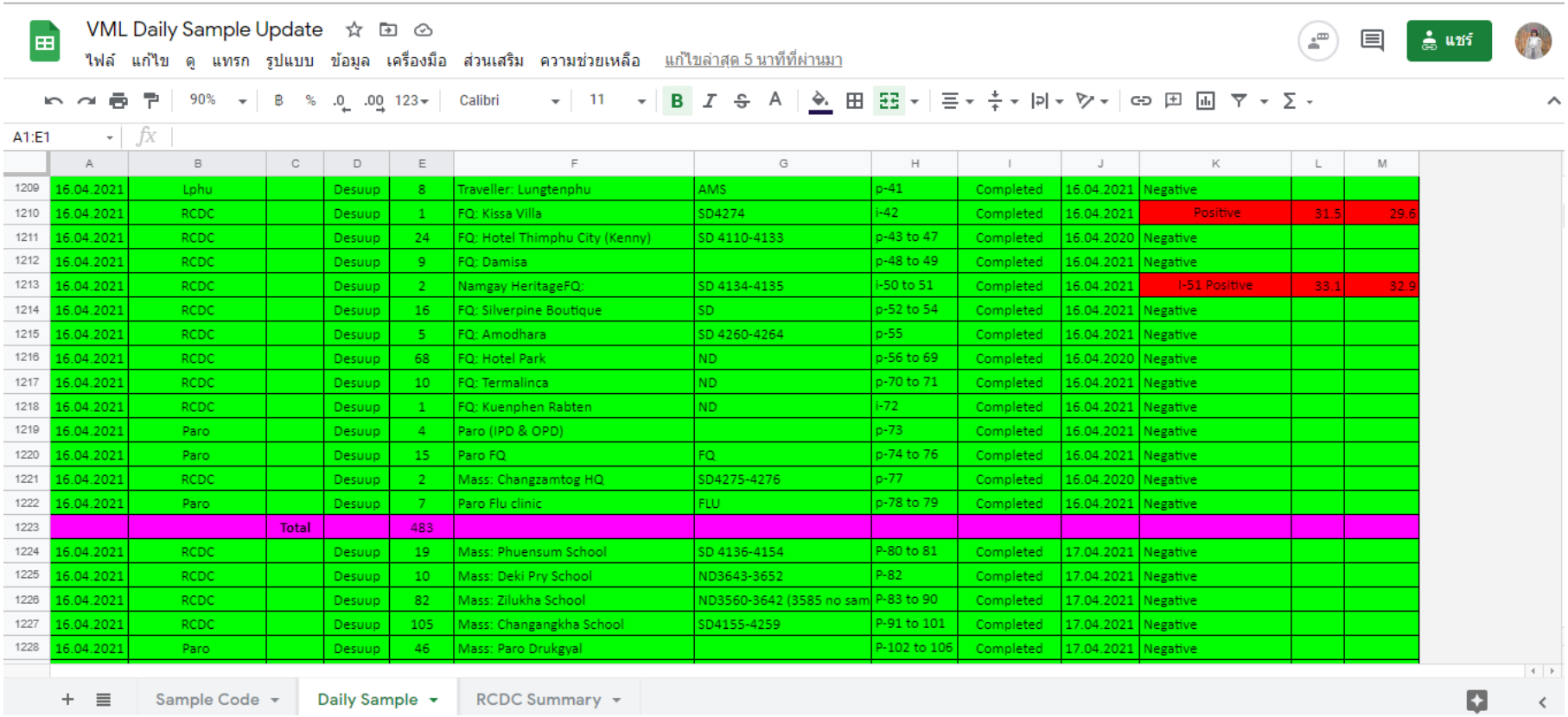


Tasks & Achievement

Summary of COVID-19 testing in RCDC on 14th April 2021- 26th April 2021

Date	Quarantine Facilities	Frontline Workers	Community Screening	Negative	Positive	Total
2021-04-14	265	50	49	364	0	364
2021-04-15	165	16	60	241	0	241
2021-04-16	197	63	223	483	2	483
2021-04-17	242	15	345	600	1	602
2021-04-18	178	66	1717	1959	2	1961
2021-04-19	284	37	1622	1940	3	1943
2021-04-20	203	82	2474	2757	2	2759
2021-04-21	280	127	828	1233	2	1235
2021-04-22	161	44	219	420	4	424
2021-04-23	184	196	700	1080	0	1080
2021-04-24	136	25	402	563	0	563
2021-04-25	85	38	44	167	0	167
2021-04-26	259	174	191	624	0	624

1. Verify receiving samples from spreadsheet which recorded total received from COVID-19 laboratory, Data team have to verify sample code and line lists from JOT from and HFS system then generate the report



VML Daily Sample Update

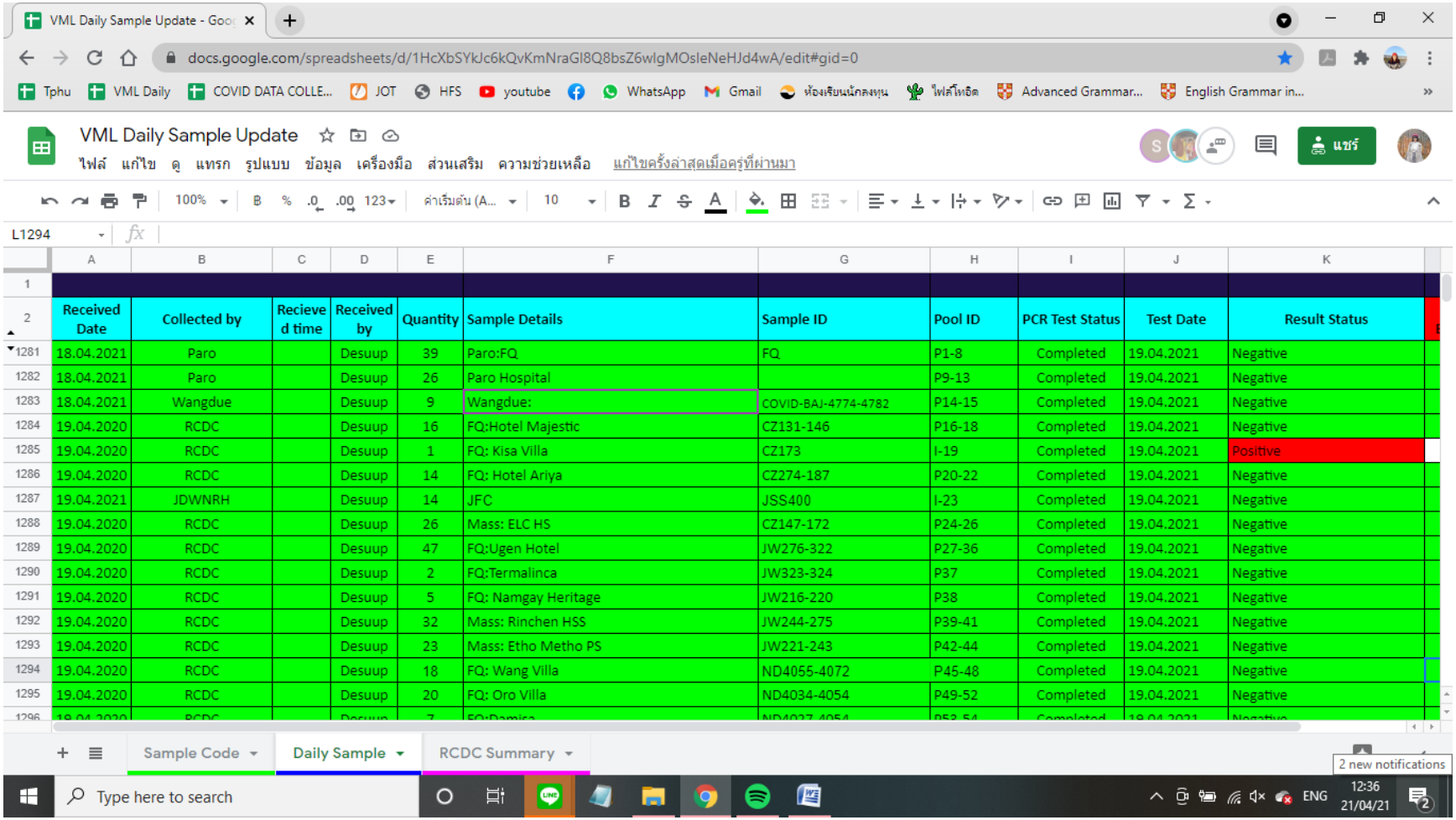
ไฟล์ แก้ไข ดู แทรก รูปแบบ ข้อมูล เครื่องมือ ส่วนเสริม ความช่วยเหลือ แก้ไขล่าสุด 5 นาทีที่ผ่านมา

A1:E1

	A	B	C	D	E	F	G	H	I	J	K	L	M
1209	16.04.2021	Lphu		Desuup	8	Traveller: Lungtenphu	AMS	p-41	Completed	16.04.2021	Negative		
1210	16.04.2021	RCDC		Desuup	1	FQ: Kissa Villa	SD4274	i-42	Completed	16.04.2021	Positive	31.5	29.6
1211	16.04.2021	RCDC		Desuup	24	FQ: Hotel Thimphu City (Kenny)	SD 4110-4133	p-43 to 47	Completed	16.04.2020	Negative		
1212	16.04.2021	RCDC		Desuup	9	FQ: Damisa		p-48 to 49	Completed	16.04.2021	Negative		
1213	16.04.2021	RCDC		Desuup	2	Namgay HeritageFQ:	SD 4134-4135	i-50 to 51	Completed	16.04.2021	I-51 Positive	33.1	32.9
1214	16.04.2021	RCDC		Desuup	16	FQ: Silverpine Boutique	SD	p-52 to 54	Completed	16.04.2021	Negative		
1215	16.04.2021	RCDC		Desuup	5	FQ: Amodhara	SD 4260-4264	p-55	Completed	16.04.2021	Negative		
1216	16.04.2021	RCDC		Desuup	68	FQ: Hotel Park	ND	p-56 to 69	Completed	16.04.2020	Negative		
1217	16.04.2021	RCDC		Desuup	10	FQ: Termalinca	ND	p-70 to 71	Completed	16.04.2021	Negative		
1218	16.04.2021	RCDC		Desuup	1	FQ: Kuenphen Rabten	ND	i-72	Completed	16.04.2021	Negative		
1219	16.04.2021	Paro		Desuup	4	Paro (IPD & OPD)		p-73	Completed	16.04.2021	Negative		
1220	16.04.2021	Paro		Desuup	15	Paro FQ	FQ	p-74 to 76	Completed	16.04.2021	Negative		
1221	16.04.2021	RCDC		Desuup	2	Mass: Changzamtog HQ	SD4275-4276	p-77	Completed	16.04.2020	Negative		
1222	16.04.2021	Paro		Desuup	7	Paro Flu clinic	FLU	p-78 to 79	Completed	16.04.2021	Negative		
1223			Total		483								
1224	16.04.2021	RCDC		Desuup	19	Mass: Phuensum School	SD 4136-4154	P-80 to 81	Completed	17.04.2021	Negative		
1225	16.04.2021	RCDC		Desuup	10	Mass: Deki Pry School	ND3643-3652	P-82	Completed	17.04.2021	Negative		
1226	16.04.2021	RCDC		Desuup	82	Mass: Zilukha School	ND3560-3642 (3585 no sam	P-83 to 90	Completed	17.04.2021	Negative		
1227	16.04.2021	RCDC		Desuup	105	Mass: Changangkha School	SD4155-4259	P-91 to 101	Completed	17.04.2021	Negative		
1228	16.04.2021	Paro		Desuup	46	Mass: Paro Drukgyal		P-102 to 106	Completed	17.04.2021	Negative		

Sample Code | Daily Sample | RCDC Summary

Example of spreadsheet to record all COVID-19 sample receiving, test status, test result

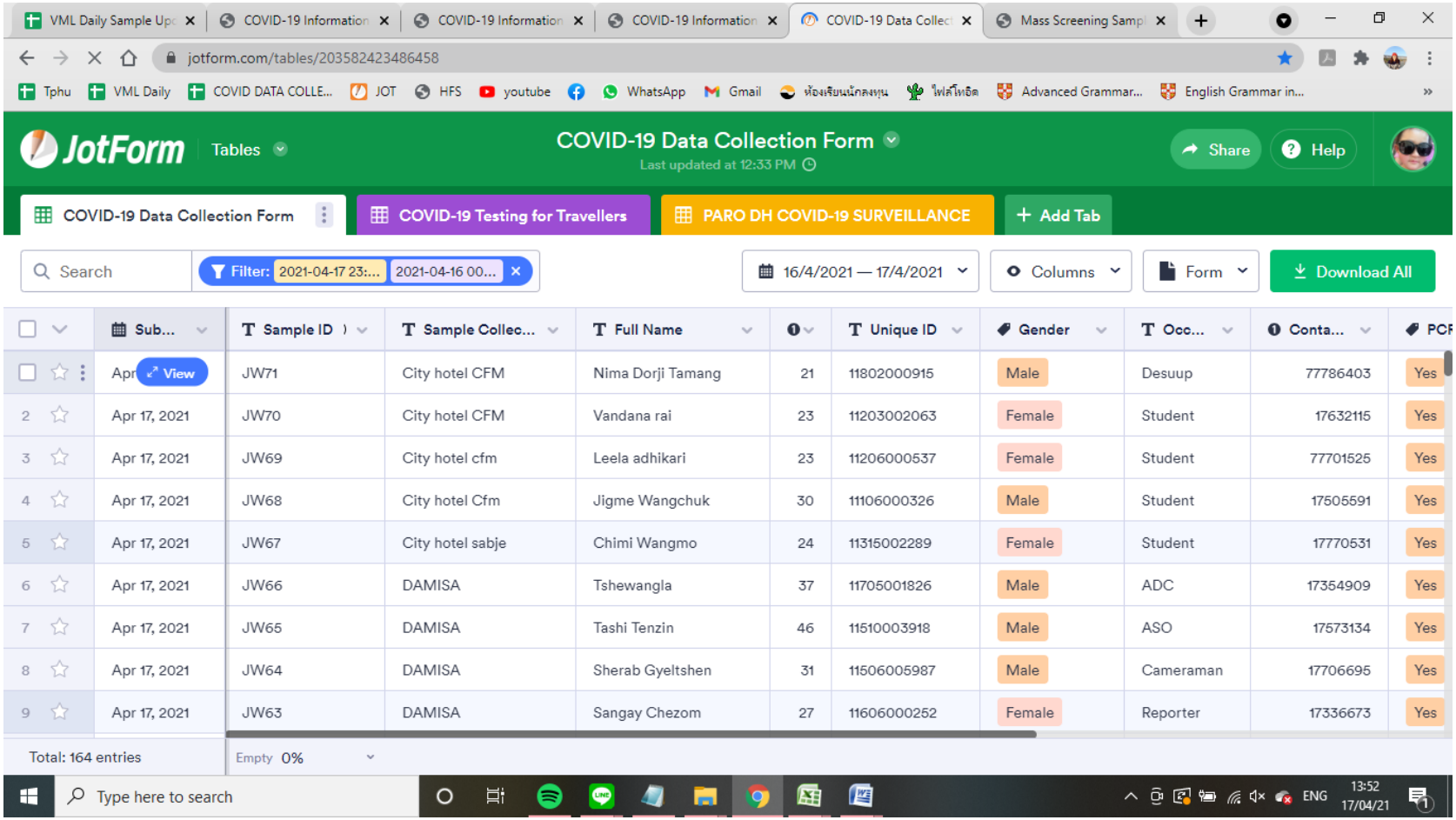


VML Daily Sample Update

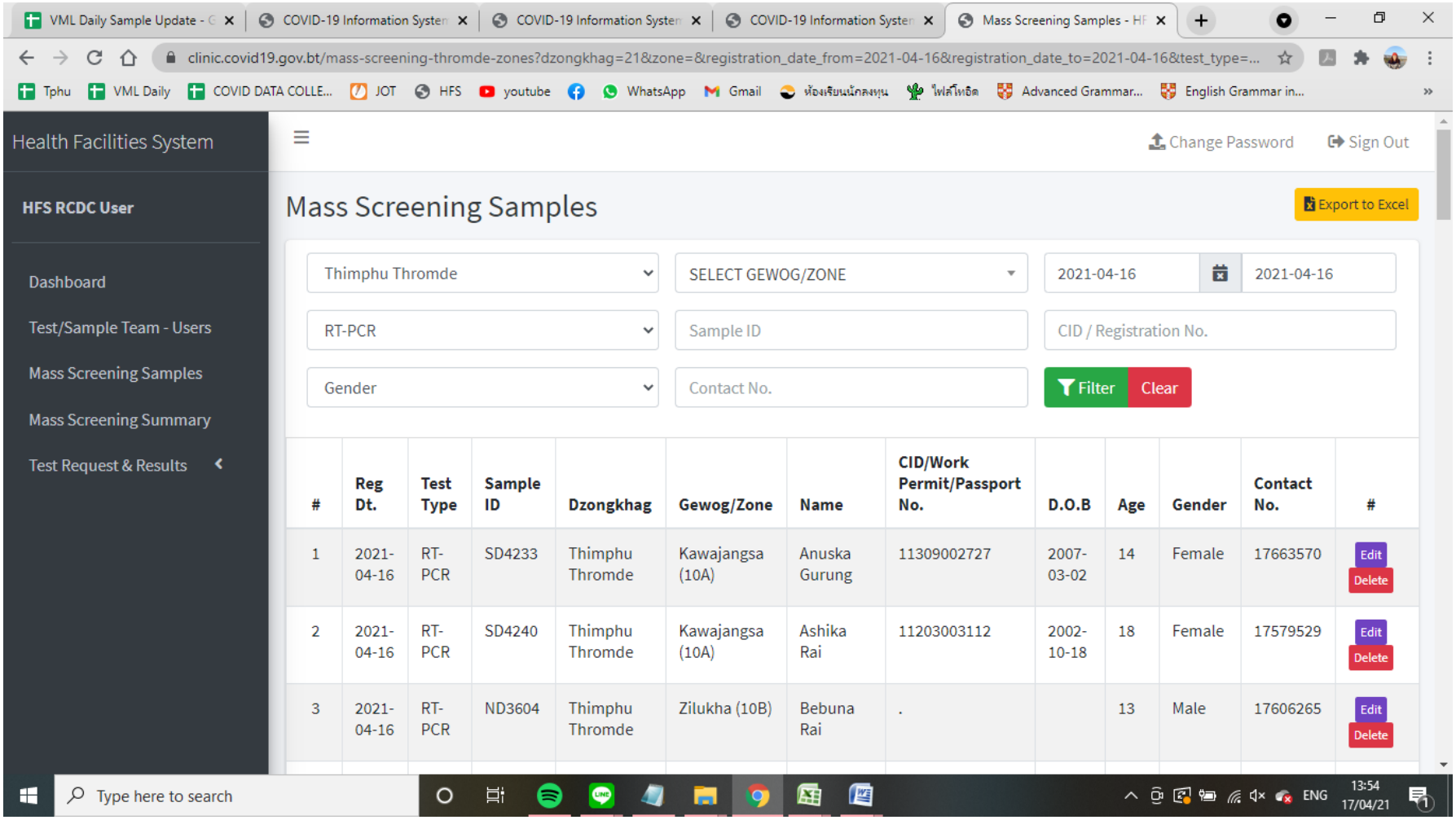
Received Date	Collected by	Recieved time	Received by	Quantity	Sample Details	Sample ID	Pool ID	PCR Test Status	Test Date	Result Status
18.04.2021	Paro		Desuup	39	Paro:FQ	FQ	P1-8	Completed	19.04.2021	Negative
18.04.2021	Paro		Desuup	26	Paro Hospital		P9-13	Completed	19.04.2021	Negative
18.04.2021	Wangdue		Desuup	9	Wangdue:	COVID-BAJ-4774-4782	P14-15	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	16	FQ:Hotel Majestic	CZ131-146	P16-18	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	1	FQ: Kisa Villa	CZ173	I-19	Completed	19.04.2021	Positive
19.04.2020	RCDC		Desuup	14	FQ: Hotel Ariya	CZ274-187	P20-22	Completed	19.04.2021	Negative
19.04.2021	JDWNRH		Desuup	14	JFC	JSS400	I-23	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	26	Mass: ELC HS	CZ147-172	P24-26	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	47	FQ:Ugen Hotel	JW276-322	P27-36	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	2	FQ:Termalinca	JW323-324	P37	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	5	FQ: Namgay Heritage	JW216-220	P38	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	32	Mass: Rinchen HSS	JW244-275	P39-41	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	23	Mass: Etho Metho PS	JW221-243	P42-44	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	18	FQ: Wang Villa	ND4055-4072	P45-48	Completed	19.04.2021	Negative
19.04.2020	RCDC		Desuup	20	FQ: Oro Villa	ND4034-4054	P49-52	Completed	19.04.2021	Negative

Example of spreadsheet to record all COVID-19 sample receiving, test status, test result

2. Verify raw data from collection team in online JOT & HFS form and compare with total received in spreadsheet

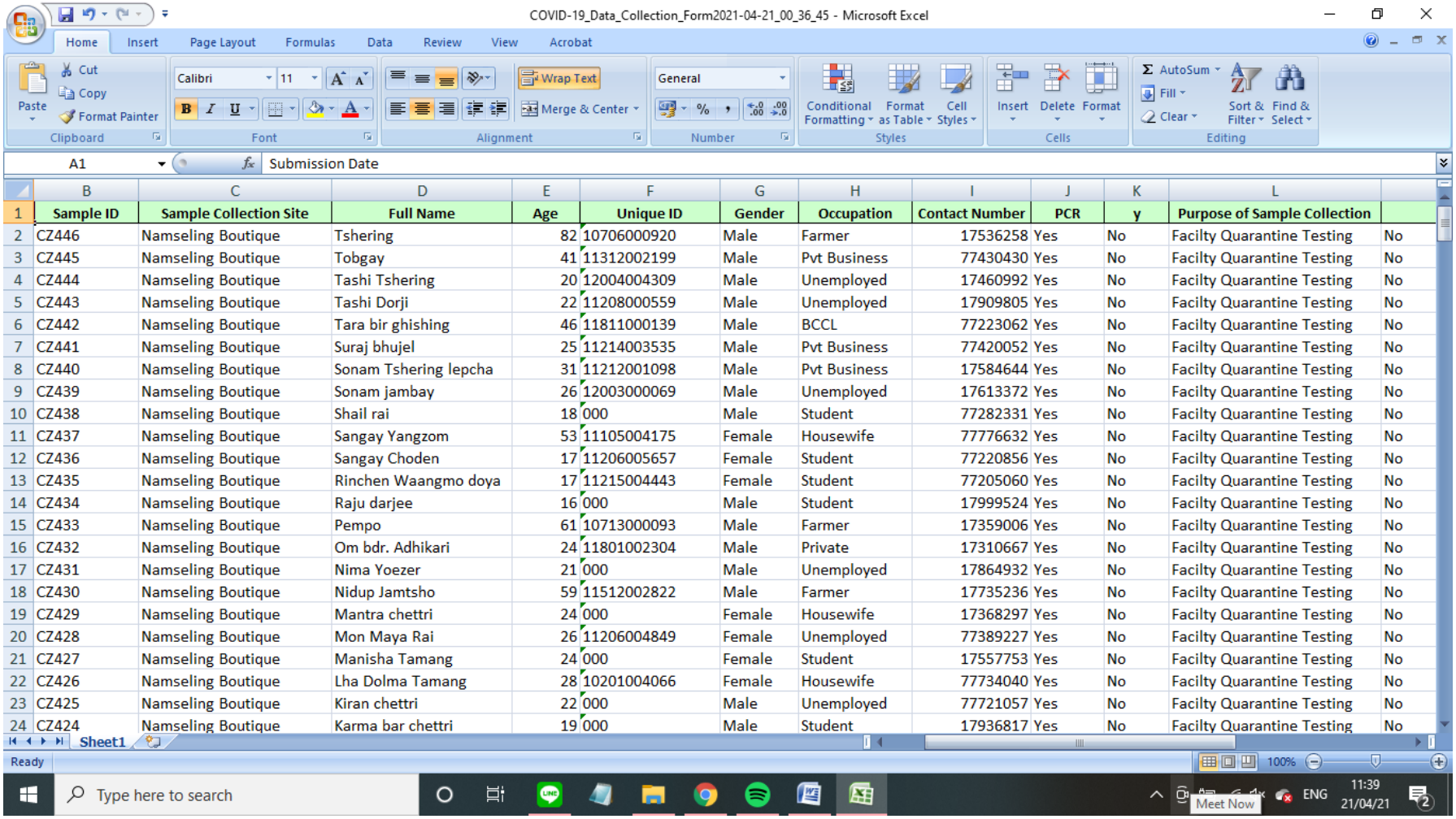


Example of raw data of COVID-19 samples in JOT form



Example of raw data of COVID-19 samples in HFS system

3. **Download data from JOT and HFS**

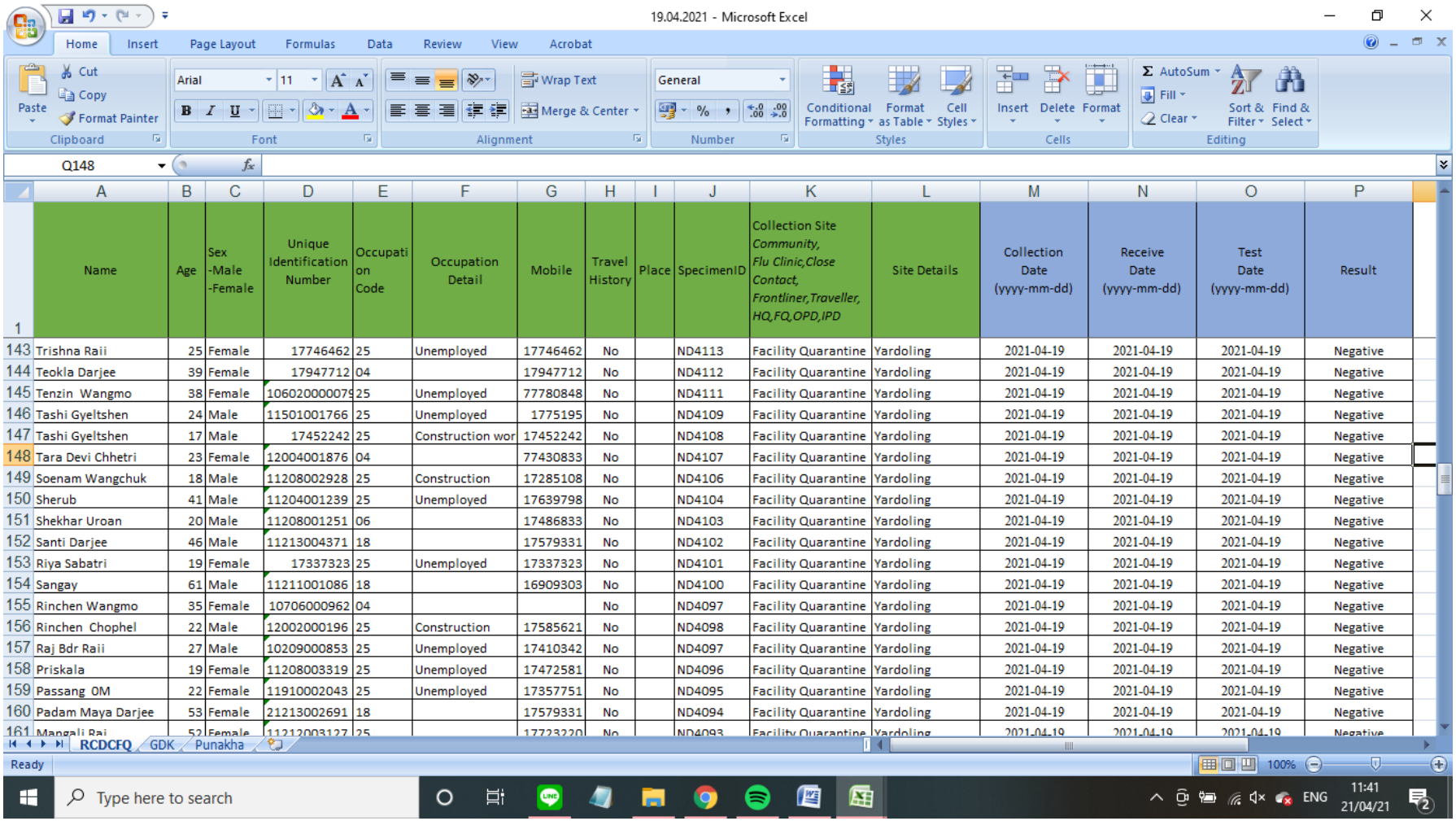


COVID-19_Data_Collection_Form2021-04-21_00_36_45 - Microsoft Excel

	Sample ID	Sample Collection Site	Full Name	Age	Unique ID	Gender	Occupation	Contact Number	PCR	y	Purpose of Sample Collection	
2	CZ446	Namseling Boutique	Tshering	82	10706000920	Male	Farmer	17536258	Yes	No	Facilty Quarantine Testing	No
3	CZ445	Namseling Boutique	Tobgay	41	11312002199	Male	Pvt Business	77430430	Yes	No	Facilty Quarantine Testing	No
4	CZ444	Namseling Boutique	Tashi Tshering	20	12004004309	Male	Unemployed	17460992	Yes	No	Facilty Quarantine Testing	No
5	CZ443	Namseling Boutique	Tashi Dorji	22	11208000559	Male	Unemployed	17909805	Yes	No	Facilty Quarantine Testing	No
6	CZ442	Namseling Boutique	Tara bir ghishing	46	11811000139	Male	BCCL	77223062	Yes	No	Facilty Quarantine Testing	No
7	CZ441	Namseling Boutique	Suraj bhujel	25	11214003535	Male	Pvt Business	77420052	Yes	No	Facilty Quarantine Testing	No
8	CZ440	Namseling Boutique	Sonam Tshering lepcha	31	11212001098	Male	Pvt Business	17584644	Yes	No	Facilty Quarantine Testing	No
9	CZ439	Namseling Boutique	Sonam jambay	26	12003000069	Male	Unemployed	17613372	Yes	No	Facilty Quarantine Testing	No
10	CZ438	Namseling Boutique	Shail rai	18	000	Male	Student	77282331	Yes	No	Facilty Quarantine Testing	No
11	CZ437	Namseling Boutique	Sangay Yangzom	53	11105004175	Female	Housewife	77776632	Yes	No	Facilty Quarantine Testing	No
12	CZ436	Namseling Boutique	Sangay Choden	17	11206005657	Female	Student	77220856	Yes	No	Facilty Quarantine Testing	No
13	CZ435	Namseling Boutique	Rinchen Waangmo doya	17	11215004443	Female	Student	77205060	Yes	No	Facilty Quarantine Testing	No
14	CZ434	Namseling Boutique	Raju darjee	16	000	Male	Student	17999524	Yes	No	Facilty Quarantine Testing	No
15	CZ433	Namseling Boutique	Pempo	61	10713000093	Male	Farmer	17359006	Yes	No	Facilty Quarantine Testing	No
16	CZ432	Namseling Boutique	Om bdr. Adhikari	24	11801002304	Male	Private	17310667	Yes	No	Facilty Quarantine Testing	No
17	CZ431	Namseling Boutique	Nima Yoezer	21	000	Male	Unemployed	17864932	Yes	No	Facilty Quarantine Testing	No
18	CZ430	Namseling Boutique	Nidup Jamtsho	59	11512002822	Male	Farmer	17735236	Yes	No	Facilty Quarantine Testing	No
19	CZ429	Namseling Boutique	Mantra chettri	24	000	Female	Housewife	17368297	Yes	No	Facilty Quarantine Testing	No
20	CZ428	Namseling Boutique	Mon Maya Rai	26	11206004849	Female	Unemployed	77389227	Yes	No	Facilty Quarantine Testing	No
21	CZ427	Namseling Boutique	Manisha Tamang	24	000	Female	Student	17557753	Yes	No	Facilty Quarantine Testing	No
22	CZ426	Namseling Boutique	Lha Dolma Tamang	28	10201004066	Female	Housewife	77734040	Yes	No	Facilty Quarantine Testing	No
23	CZ425	Namseling Boutique	Kiran chettri	22	000	Male	Unemployed	77721057	Yes	No	Facilty Quarantine Testing	No
24	CZ424	Namseling Boutique	Karma bar chettri	19	000	Male	Student	17936817	Yes	No	Facilty Quarantine Testing	No

Example of raw data downloaded from JOT form and HFS system

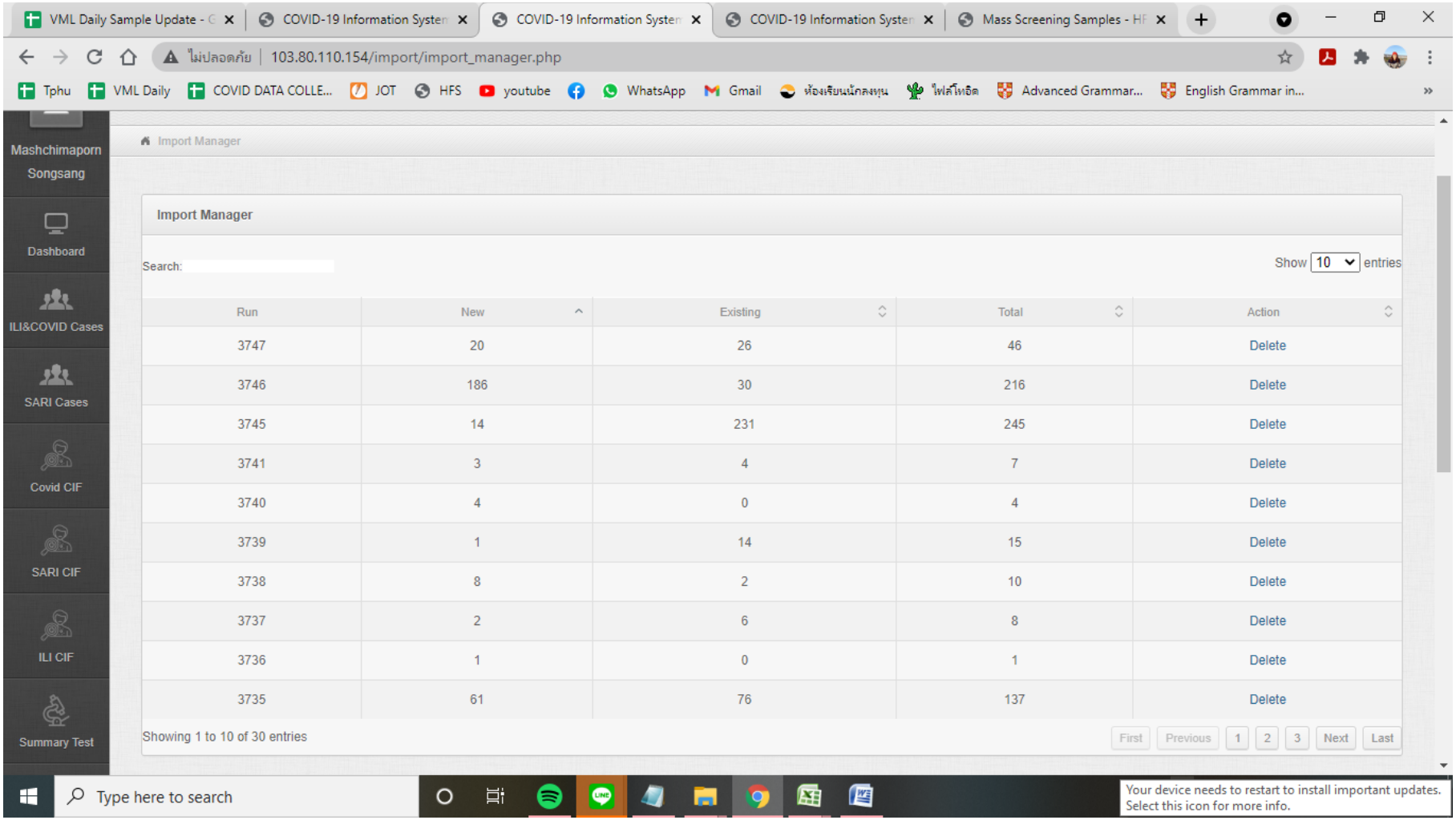
4. Verified and cleaned data in the format to import all sample information into COVID-19 system



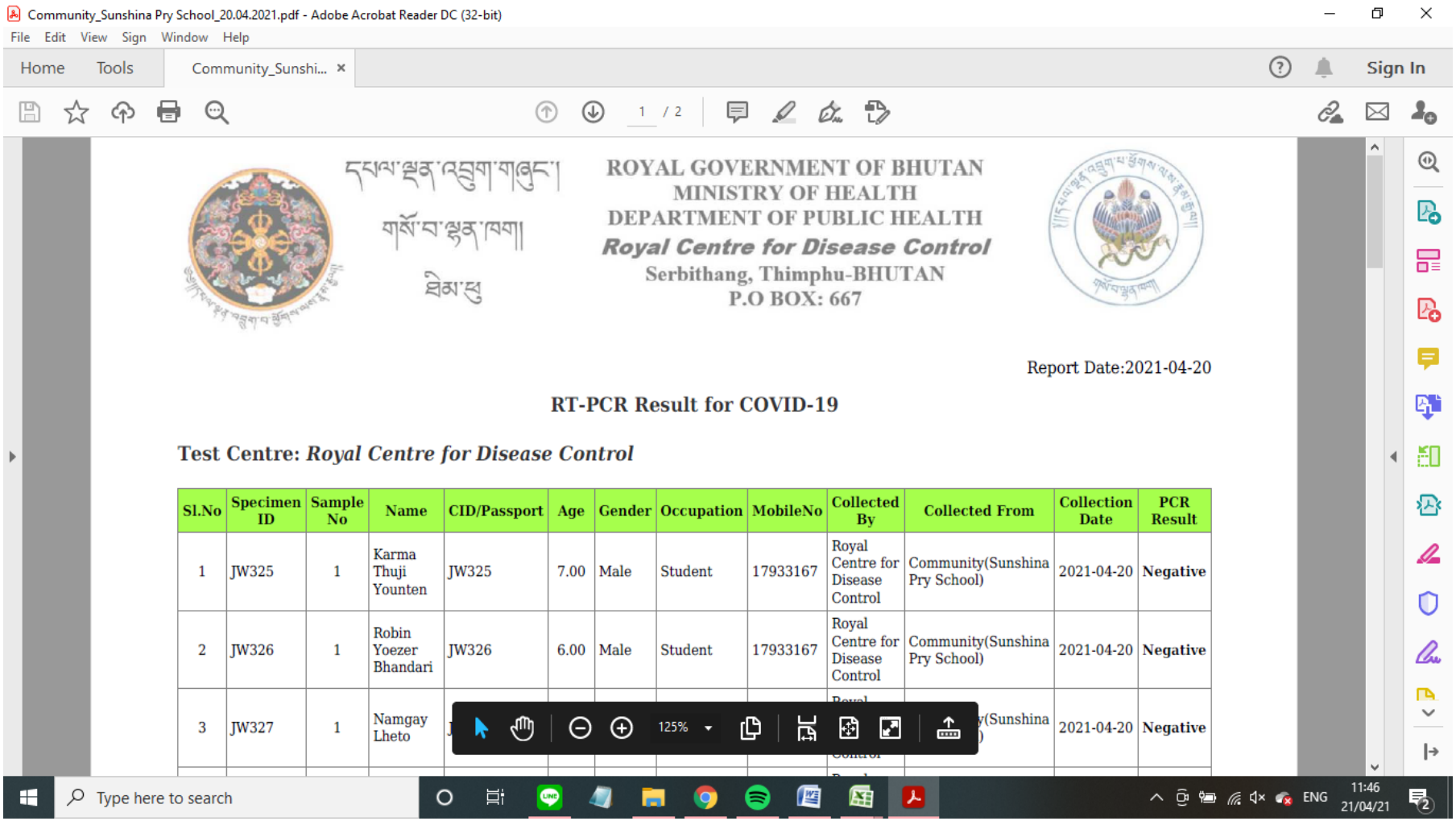
19.04.2021 - Microsoft Excel

1	Name	Age	Sex -Male -Female	Unique Identification Number	Occupation Code	Occupation Detail	Mobile	Travel History	Place	SpecimenID	Collection Site *Community, Flu Clinic,Close Contact, Frontliner,Traveller, HQ,FQ,OPD,IPD*	Site Details	Collection Date (yyyy-mm-dd)	Receive Date (yyyy-mm-dd)	Test Date (yyyy-mm-dd)	Result
143	Trishna Rai	25	Female	17746462	25	Unemployed	17746462	No		ND4113	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
144	Teokla Darjee	39	Female	17947712	04		17947712	No		ND4112	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
145	Tenzin Wangmo	38	Female	106020000079	25	Unemployed	77780848	No		ND4111	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
146	Tashi Gyeltshen	24	Male	11501001766	25	Unemployed	1775195	No		ND4109	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
147	Tashi Gyeltshen	17	Male	17452242	25	Construction wor	17452242	No		ND4108	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
148	Tara Devi Chhetri	23	Female	12004001876	04		77430833	No		ND4107	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
149	Soenam Wangchuk	18	Male	11208002928	25	Construction	17285108	No		ND4106	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
150	Sherub	41	Male	11204001239	25	Unemployed	17639798	No		ND4104	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
151	Shekhar Uroan	20	Male	11208001251	06		17486833	No		ND4103	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
152	Santi Darjee	46	Male	11213004371	18		17579331	No		ND4102	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
153	Riya Sabatri	19	Female	17337323	25	Unemployed	17337323	No		ND4101	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
154	Sangay	61	Male	11211001086	18		16909303	No		ND4100	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
155	Rinchen Wangmo	35	Female	10706000962	04			No		ND4097	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
156	Rinchen Chophel	22	Male	12002000196	25	Construction	17585621	No		ND4098	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
157	Raj Bdr Rai	27	Male	10209000853	25	Unemployed	17410342	No		ND4097	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
158	Priskala	19	Female	11208003319	25	Unemployed	17472581	No		ND4096	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
159	Passang 0M	22	Female	11910002043	25	Unemployed	17357751	No		ND4095	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
160	Padam Maya Darjee	53	Female	21213002691	18		17579331	No		ND4094	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative
161	Manggli Rai	52	Female	11212003127	25		17723220	No		ND4093	Facility Quarantine	Yardoling	2021-04-19	2021-04-19	2021-04-19	Negative

5. Import data into COVID-19 system in RCDC website



6. Generated COVID-19 report from COVID-19 system to be share to focal person after test completed



Community_Sunshina Pry School_20.04.2021.pdf - Adobe Acrobat Reader DC (32-bit)

File Edit View Sign Window Help

Home Tools Community_Sunshi... Sign In

1 / 2

ROYAL GOVERNMENT OF BHUTAN
MINISTRY OF HEALTH
DEPARTMENT OF PUBLIC HEALTH
Royal Centre for Disease Control
Serbithang, Thimphu-BHUTAN
P.O BOX: 667

Report Date:2021-04-20

RT-PCR Result for COVID-19

Test Centre: *Royal Centre for Disease Control*

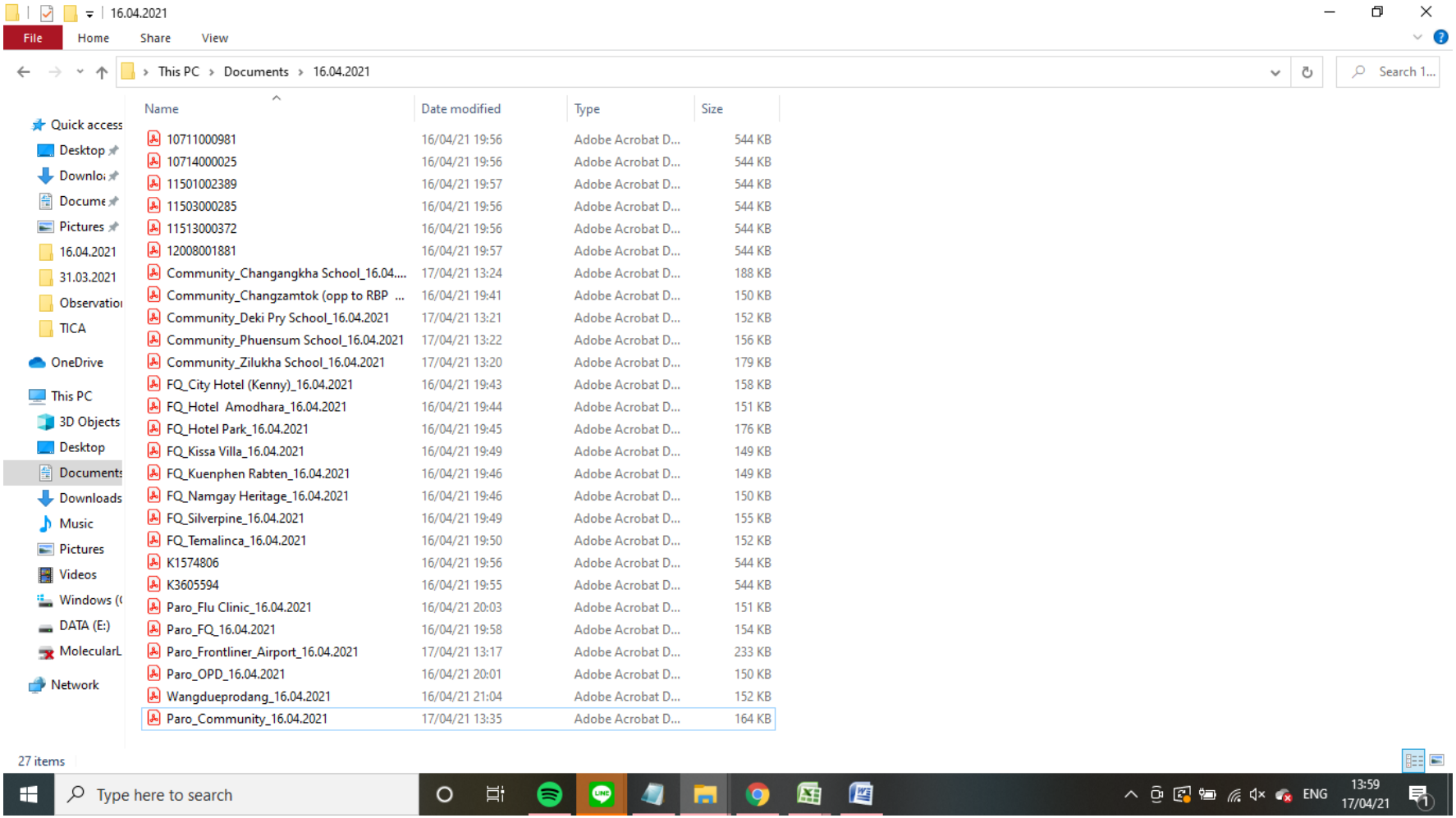
Sl.No	Specimen ID	Sample No	Name	CID/Passport	Age	Gender	Occupation	MobileNo	Collected By	Collected From	Collection Date	PCR Result
1	JW325	1	Karma Thuji Younten	JW325	7.00	Male	Student	17933167	Royal Centre for Disease Control	Community(Sunshina Pry School)	2021-04-20	**Negative**
2	JW326	1	Robin Yoezer Bhandari	JW326	6.00	Male	Student	17933167	Royal Centre for Disease Control	Community(Sunshina Pry School)	2021-04-20	**Negative**
3	JW327	1	Namgay Lheto							(Sunshina	2021-04-20	**Negative**

125%

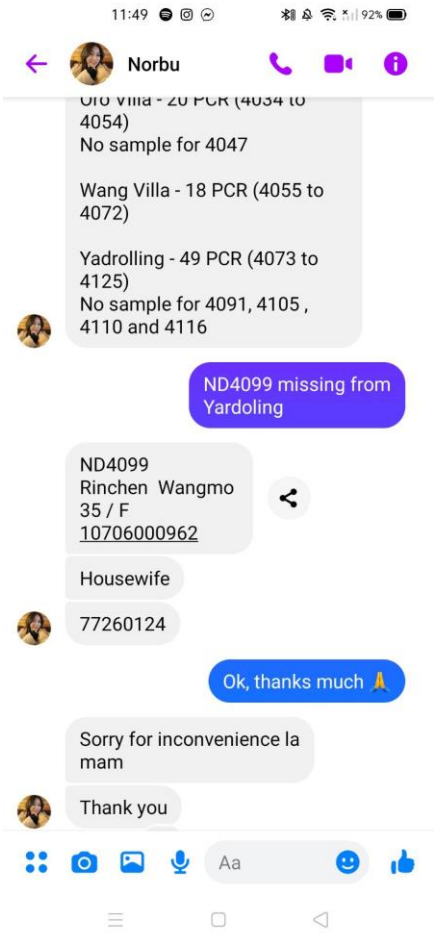
Type here to search

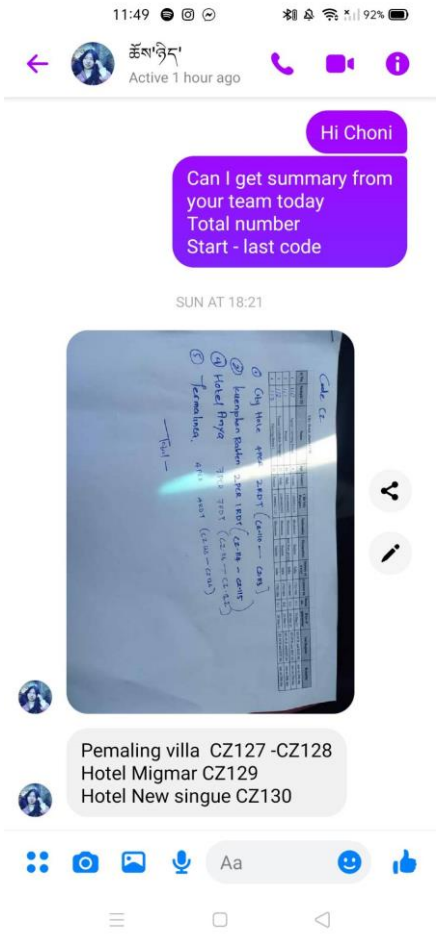
ENG 11:46 21/04/21

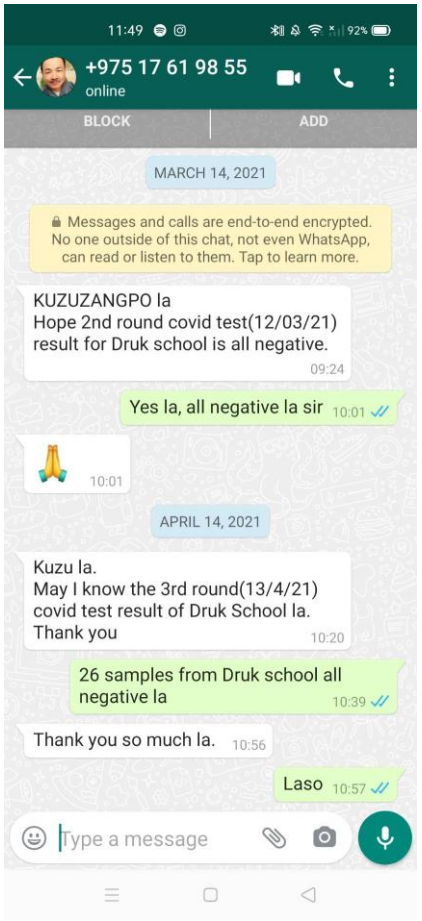
7. Report for COVID-19 will be generated and kept ready to be shared to focal person after done with testing

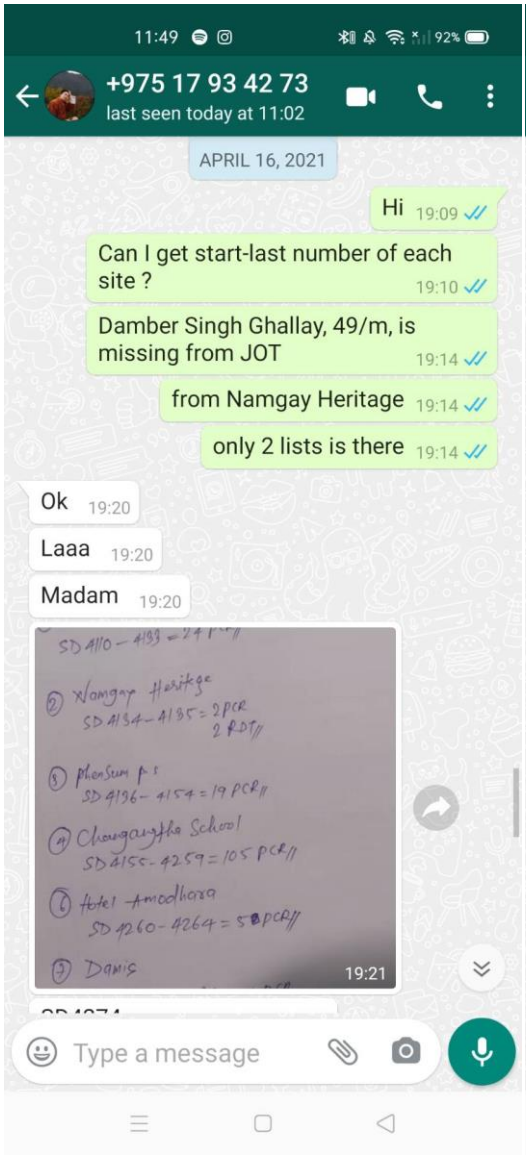


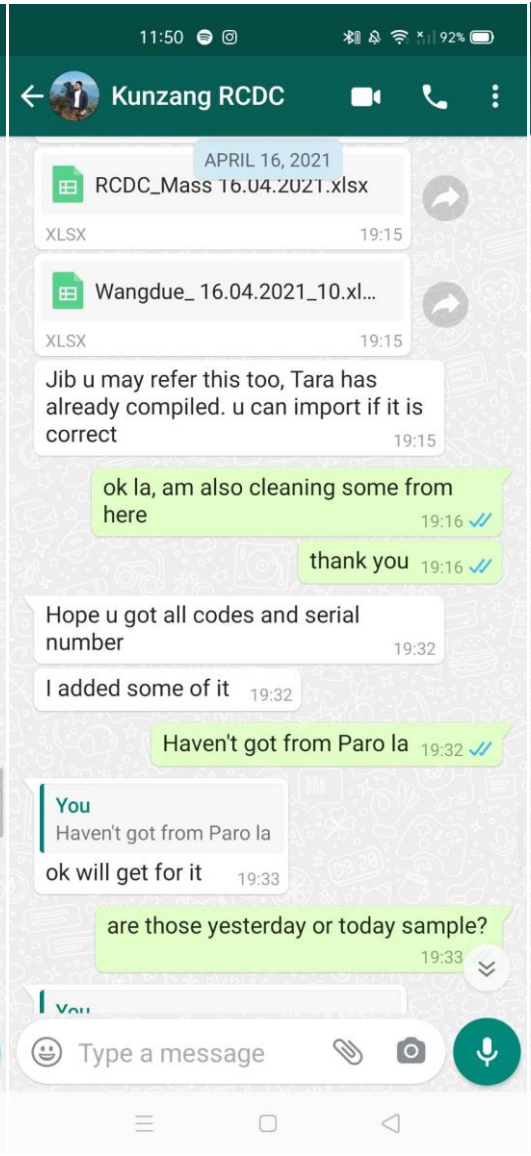
8. COVID-19 testing report shred to focal person (RCDC specialist and doctors in district hospital) as well as example daily co-ordination with collection team and district hospital in-charged about samples and line lists

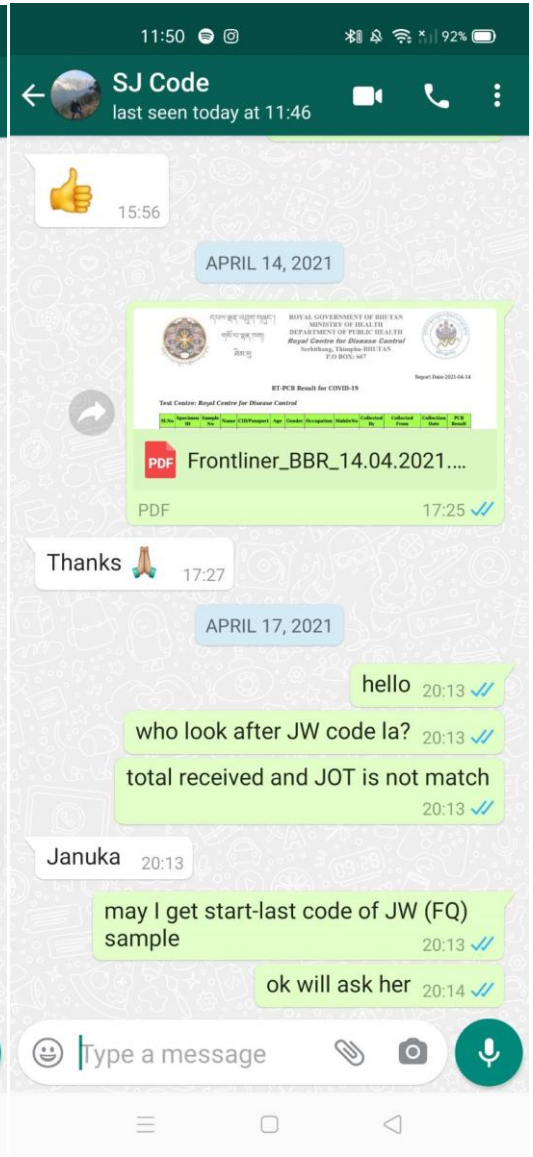


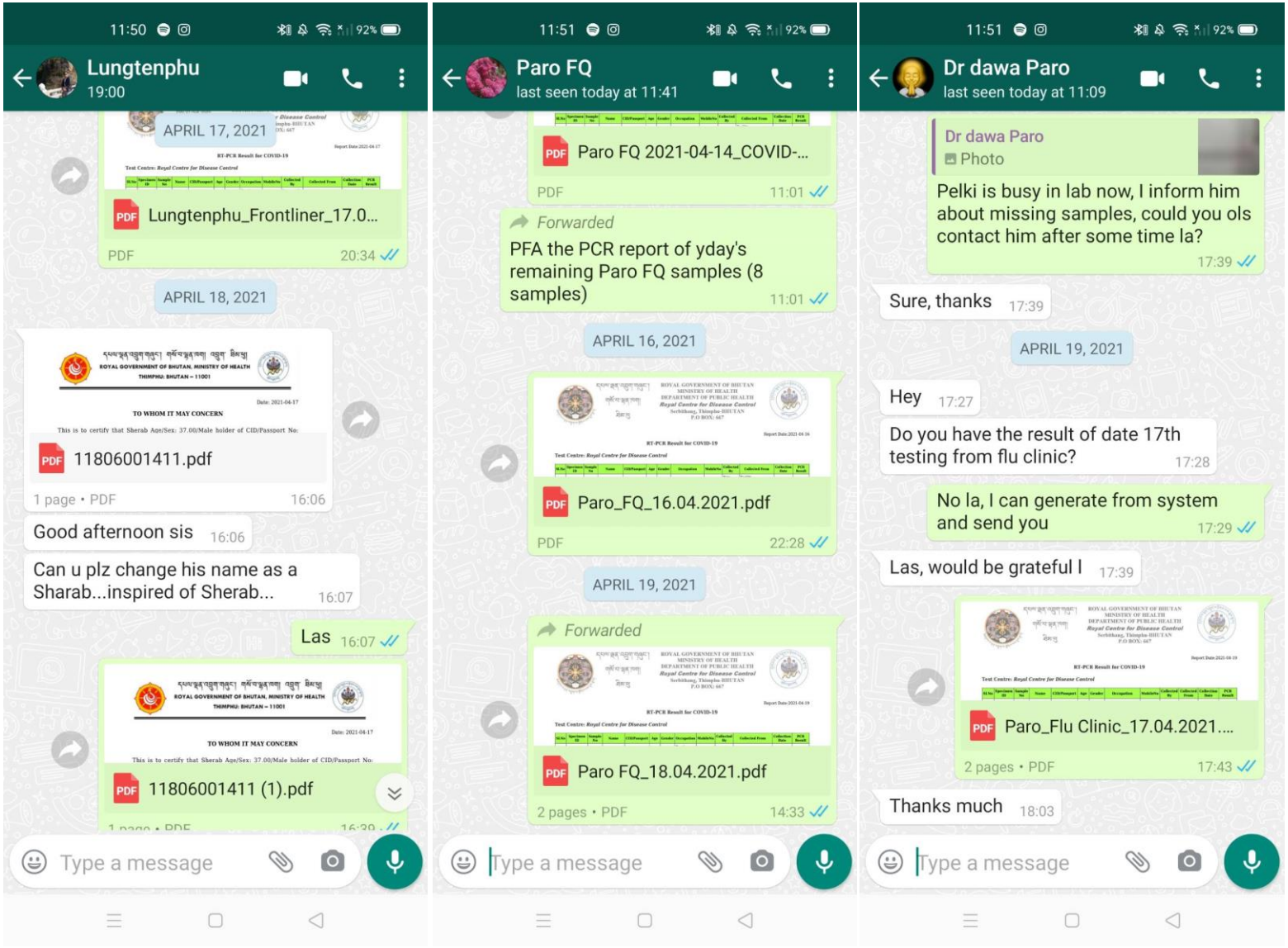


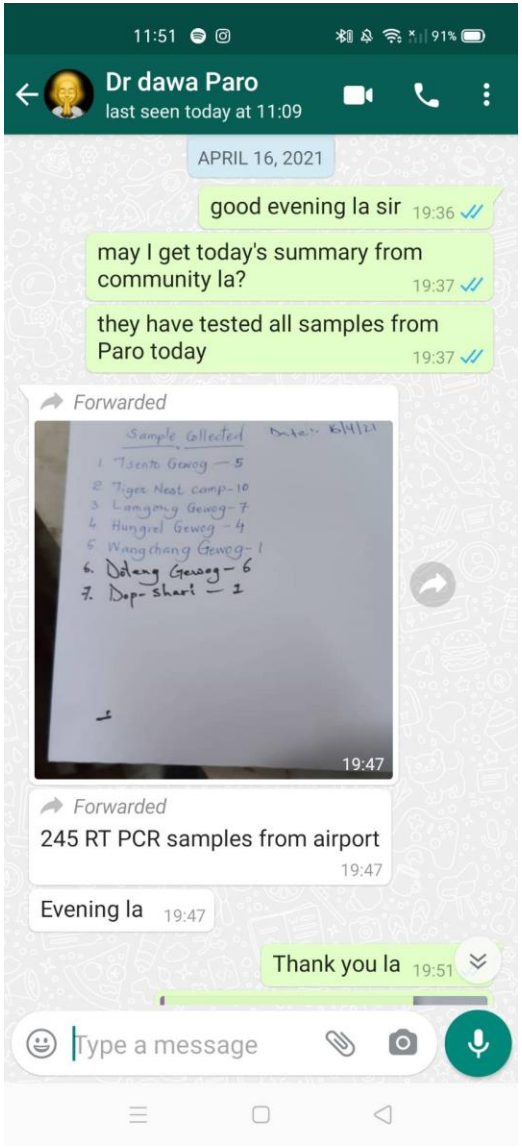


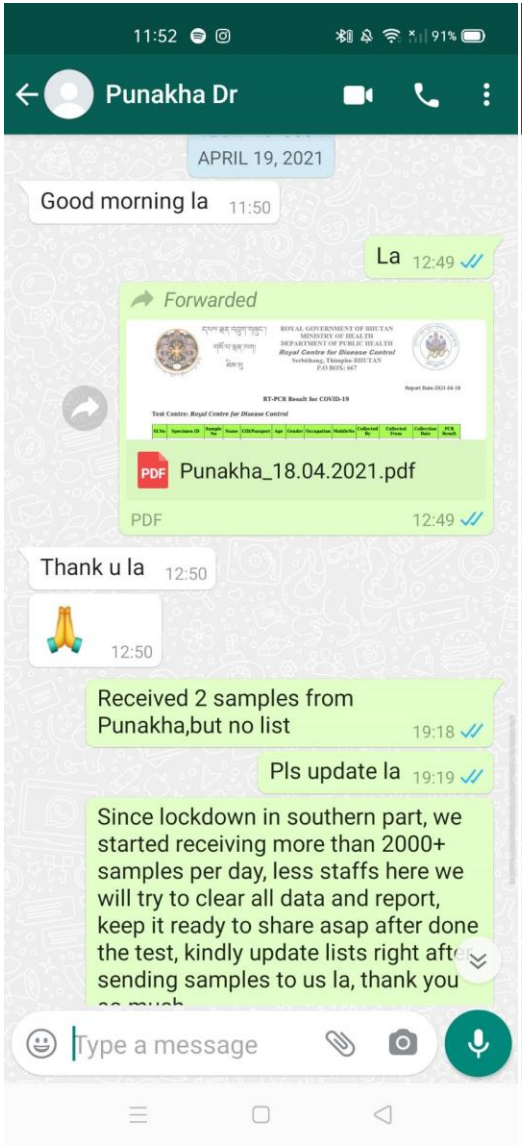

11:49
+975 17 93 42 73
last seen today at 11:02
APRIL 16, 2021
Hi 19:09
Can I get start-last number of each site ? 19:10
Damber Singh Ghallay, 49/m, is missing from JOT 19:14
from Namgay Heritage 19:14
only 2 lists is there 19:14
Ok 19:20
Laaa 19:20
Madam 19:20
19:21
Type a message

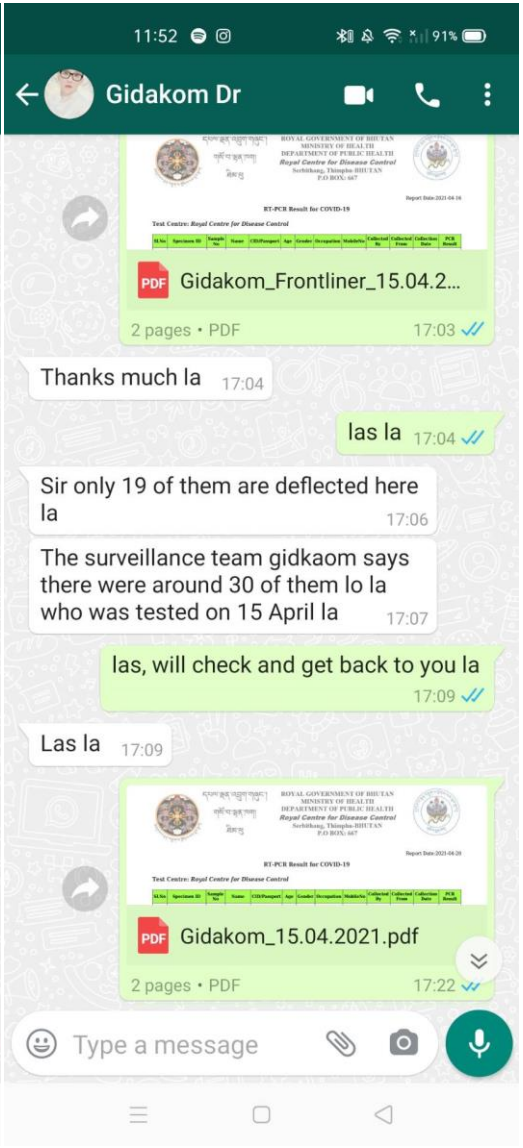

11:50
Kunzang RCDC
APRIL 16, 2021
RCDC_Mass 16.04.2021.xlsx
XLSX 19:15
Wangdue_ 16.04.2021_10.xl...
XLSX 19:15
Jib u may refer this too, Tara has already compiled. u can import if it is correct 19:15
ok la, am also cleaning some from here 19:16
thank you 19:16
Hope u got all codes and serial number 19:32
I added some of it 19:32
Haven't got from Paro la 19:32
You
Haven't got from Paro la
ok will get for it 19:33
are those yesterday or today sample? 19:33
Type a message

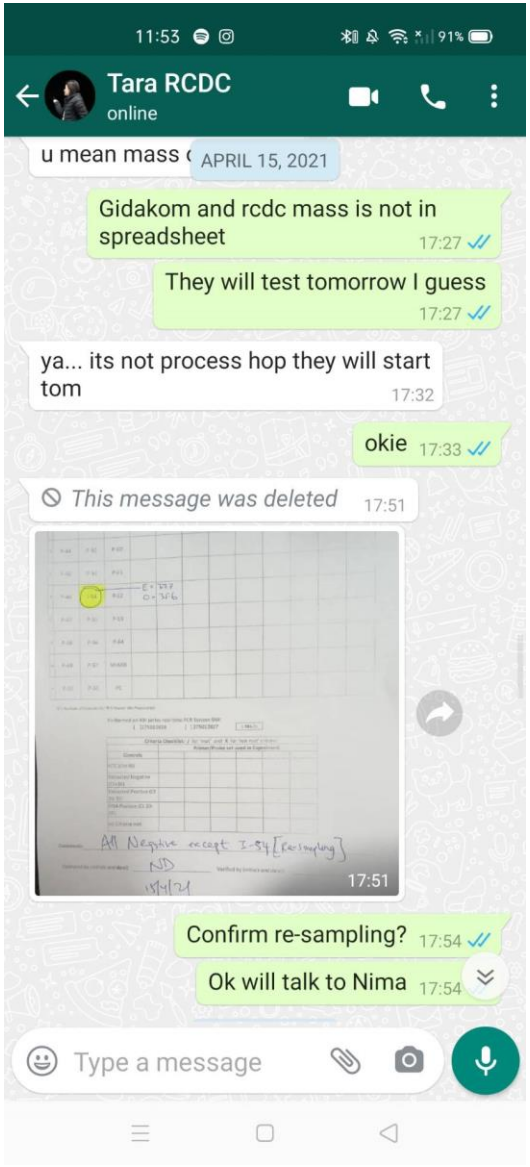

11:50
SJ Code
last seen today at 11:46
15:56
APRIL 14, 2021
Frontliner_BBR_14.04.2021....
PDF 17:25
Thanks 17:27
APRIL 17, 2021
hello 20:13
who look after JW code la? 20:13
total received and JOT is not match 20:13
Januka 20:13
may I get start-last code of JW (FQ) sample 20:13
ok will ask her 20:14
Type a message

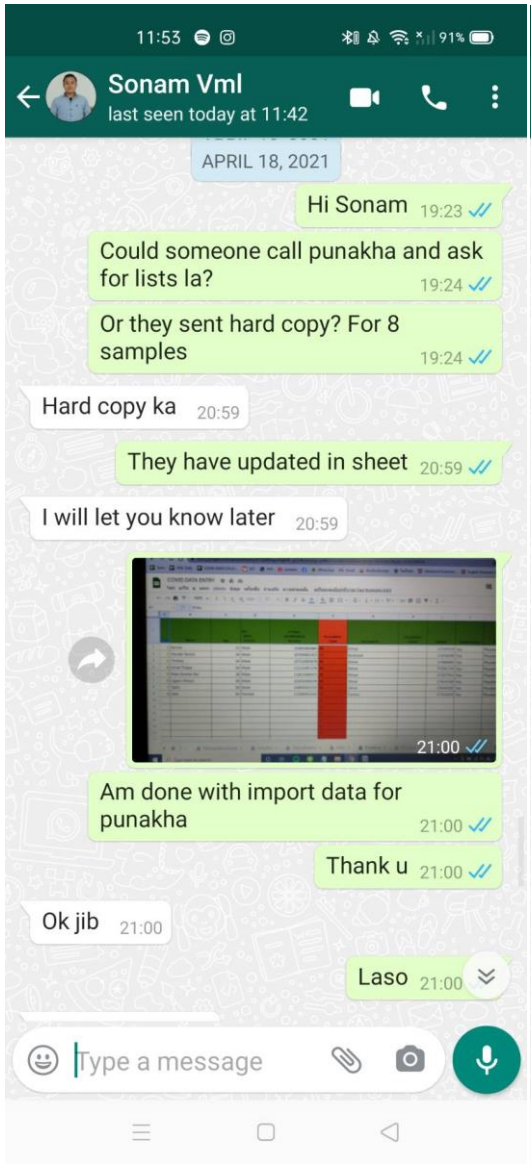

11:50
Lungtenphu
19:00
APRIL 17, 2021
Lungtenphu_Frontliner_17.0...
PDF
20:34
APRIL 18, 2021
ROYAL GOVERNMENT OF BHUTAN, MINISTRY OF HEALTH
THIMPHU: BHUTAN – 11001
TO WHOM IT MAY CONCERN
11806001411.pdf
1 page • PDF
16:06
Good afternoon sis 16:06
Can u plz change his name as a Sharab...inspired of Sherab... 16:07
Las 16:07
11806001411 (1).pdf
Type a message
11:51
Paro FQ
last seen today at 11:41
Paro FQ 2021-04-14_COVID-...
PDF
11:01
Forwarded
PFA the PCR report of yday's remaining Paro FQ samples (8 samples)
11:01
APRIL 16, 2021
Paro_FQ_16.04.2021.pdf
PDF
22:28
APRIL 19, 2021
Forwarded
Paro FQ_18.04.2021.pdf
2 pages • PDF
14:33
Type a message
11:51
Dr dawa Paro
last seen today at 11:09
Dr dawa Paro
Photo
Pelki is busy in lab now, I inform him about missing samples, could you ols contact him after some time la?
17:39
Sure, thanks 17:39
APRIL 19, 2021
Hey 17:27
Do you have the result of date 17th testing from flu clinic? 17:28
No la, I can generate from system and send you 17:29
Las, would be grateful I 17:39
Paro_Flu Clinic_17.04.2021....
2 pages • PDF
17:43
Thanks much 18:03
Type a message

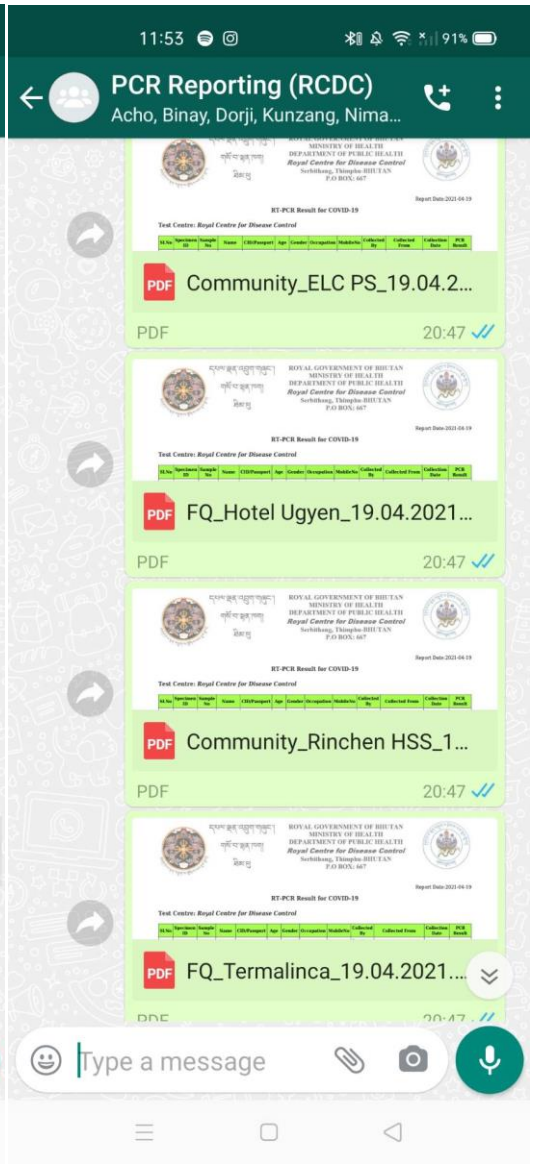

11:51
Dr dawa Paro
last seen today at 11:09
APRIL 16, 2021
good evening la sir 19:36
may I get today's summary from community la? 19:37
they have tested all samples from Paro today 19:37
Forwarded
Sample Collected
1. Tsento Gewog – 5
2. Tiger Nest comp-10
3. Langmey Gewog-7
4. Hungrel Gewog – 4
5. Wangchang Gewog-1
6. Dolang Gewog – 6
7. Dop-shari – 2
19:47
Forwarded
245 RT PCR samples from airport 19:47
Evening la 19:47
Thank you la 19:51
Type a message

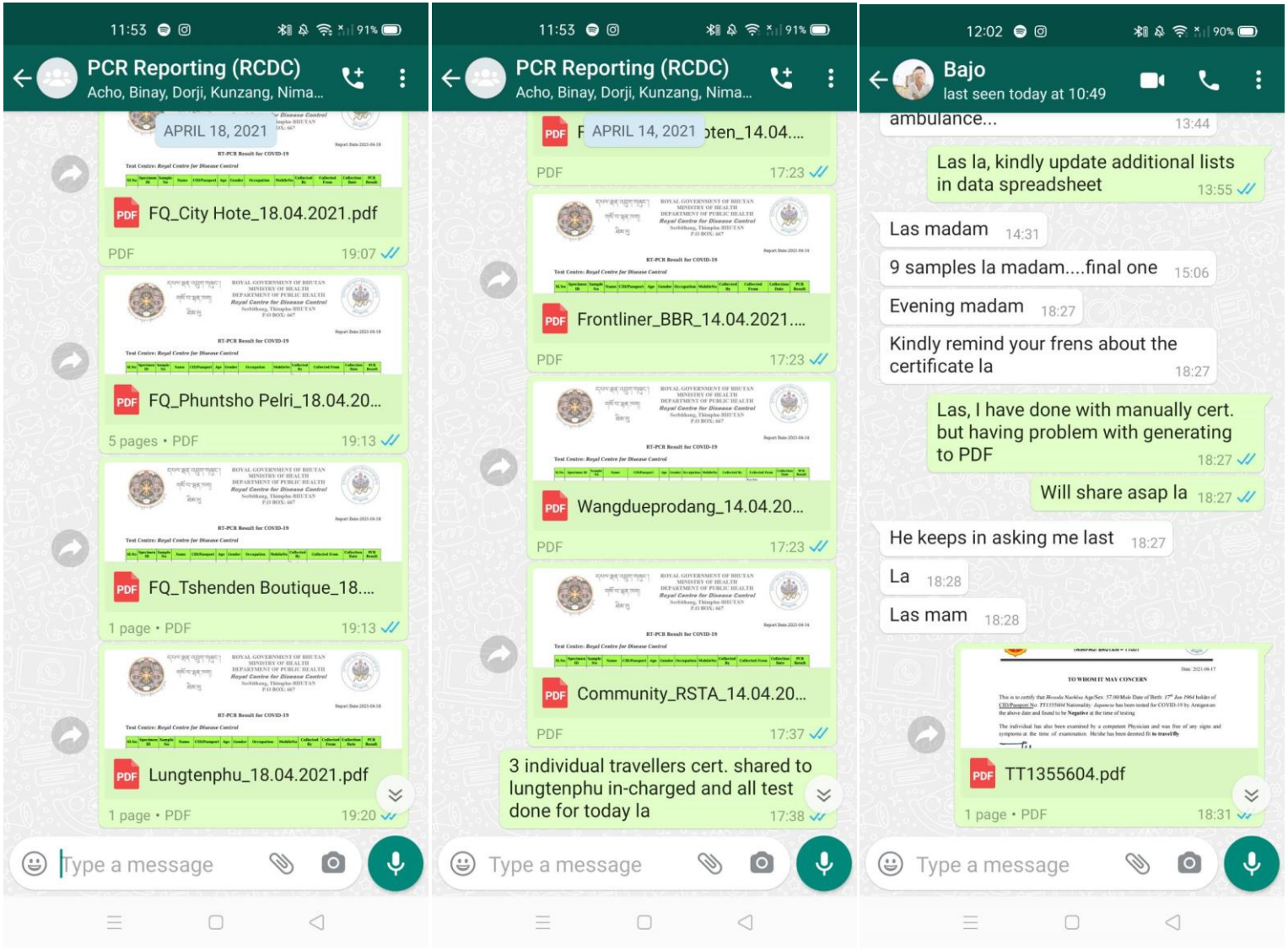

11:52
Punakha Dr
APRIL 19, 2021
Good morning la 11:50
La 12:49
Forwarded
Punakha_18.04.2021.pdf
PDF 12:49
Thank u la 12:50
12:50
Received 2 samples from Punakha,but no list 19:18
Pls update la 19:19
Since lockdown in southern part, we started receiving more than 2000+ samples per day, less staffs here we will try to clear all data and report, keep it ready to share asap after done the test, kindly update lists right aft
sending samples to us la, thank you
Type a message


11:52
Gidakom Dr
Gidakom_Frontliner_15.04.2...
2 pages • PDF 17:03
Thanks much la 17:04
las la 17:04
Sir only 19 of them are deflected here la 17:06
The surveillance team gidkaom says there were around 30 of them lo la who was tested on 15 April la 17:07
las, will check and get back to you la 17:09
Las la 17:09
Gidakom_15.04.2021.pdf
2 pages • PDF 17:22
Type a message

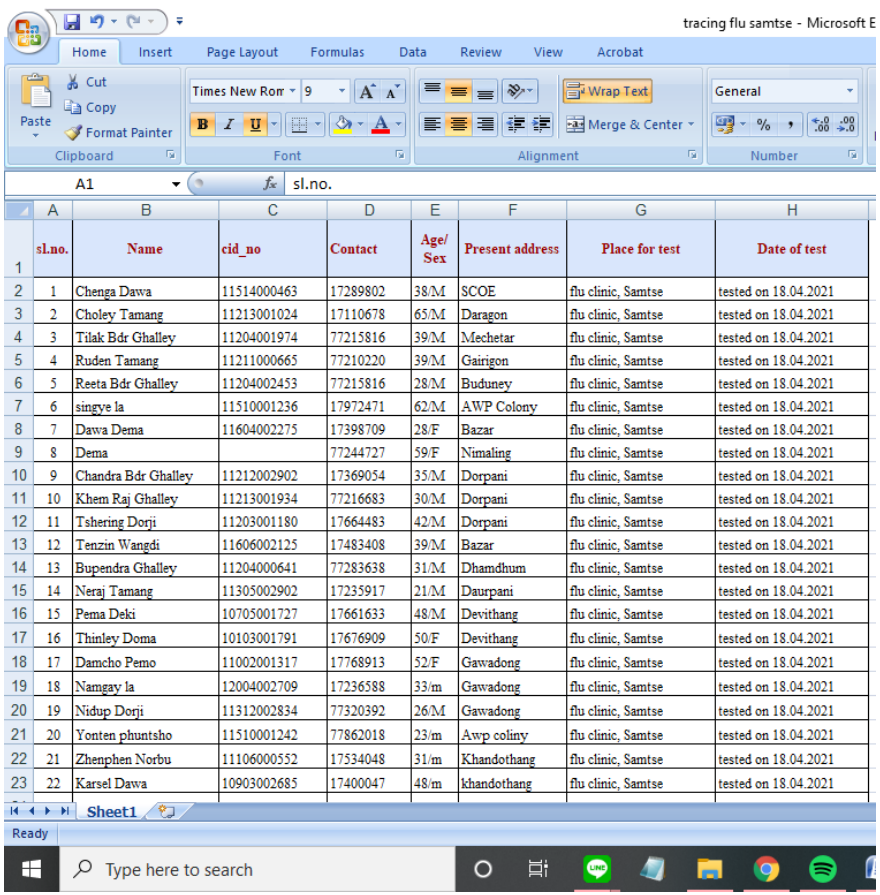

11:53
91%
Tara RCDC
online
u mean mass
APRIL 15, 2021
Gidakom and rcdc mass is not in spreadsheet 17:27
They will test tomorrow I guess 17:27
ya... its not process hop they will start tom 17:32
okie 17:33
This message was deleted 17:51
17:51
Confirm re-sampling? 17:54
Ok will talk to Nima 17:54
Type a message


11:53
91%
Sonam Vml
last seen today at 11:42
APRIL 18, 2021
Hi Sonam 19:23
Could someone call punakha and ask for lists la? 19:24
Or they sent hard copy? For 8 samples 19:24
Hard copy ka 20:59
They have updated in sheet 20:59
I will let you know later 20:59
21:00
Am done with import data for punakha 21:00
Thank u 21:00
Ok jib 21:00
Laso 21:00
Type a message


11:53
91%
PCR Reporting (RCDC)
Acho, Binay, Dorji, Kunzang, Nima...
Community_ELC PS_19.04.2...
PDF 20:47
FQ_Hotel Ugyen_19.04.2021...
PDF 20:47
Community_Rinchen HSS_1...
PDF 20:47
FQ_Termalinca_19.04.2021...
Type a message


11:53
PCR Reporting (RCDC)
Acho, Binay, Dorji, Kunzang, Nima...
APRIL 18, 2021
FQ_City Hote_18.04.2021.pdf
PDF 19:07
FQ_Phuntsho Pelri_18.04.20...
5 pages • PDF 19:13
FQ_Tshenden Boutique_18....
1 page • PDF 19:13
Lungtenphu_18.04.2021.pdf
1 page • PDF 19:20
Type a message
11:53
PCR Reporting (RCDC)
Acho, Binay, Dorji, Kunzang, Nima...
APRIL 14, 2021
PDF 17:23
Frontliner_BBR_14.04.2021....
PDF 17:23
Wangdueprodang_14.04.20...
PDF 17:23
Community_RSTA_14.04.20...
PDF 17:37
3 individual travellers cert. shared to lungtenphu in-charged and all test done for today la 17:38
Type a message
12:02
Bajo
last seen today at 10:49
ambulance... 13:44
Las la, kindly update additional lists in data spreadsheet 13:55
Las madam 14:31
9 samples la madam....final one 15:06
Evening madam 18:27
Kindly remind your frens about the certificate la 18:27
Las, I have done with manually cert. but having problem with generating to PDF 18:27
Will share asap la 18:27
He keeps in asking me last 18:27
La 18:28
Las mam 18:28
TO WHOM IT MAY CONCERN
TT1355604.pdf
1 page • PDF 18:31
Type a message

9. Bhutan government announced lockdown southern cities due to community transmission, so huge amount of COVID-19 samples from southern Bhutan communities sent to RCDC started from 17th April 2021, volunteer engaged in data and reporting as usual until 23th April 2021



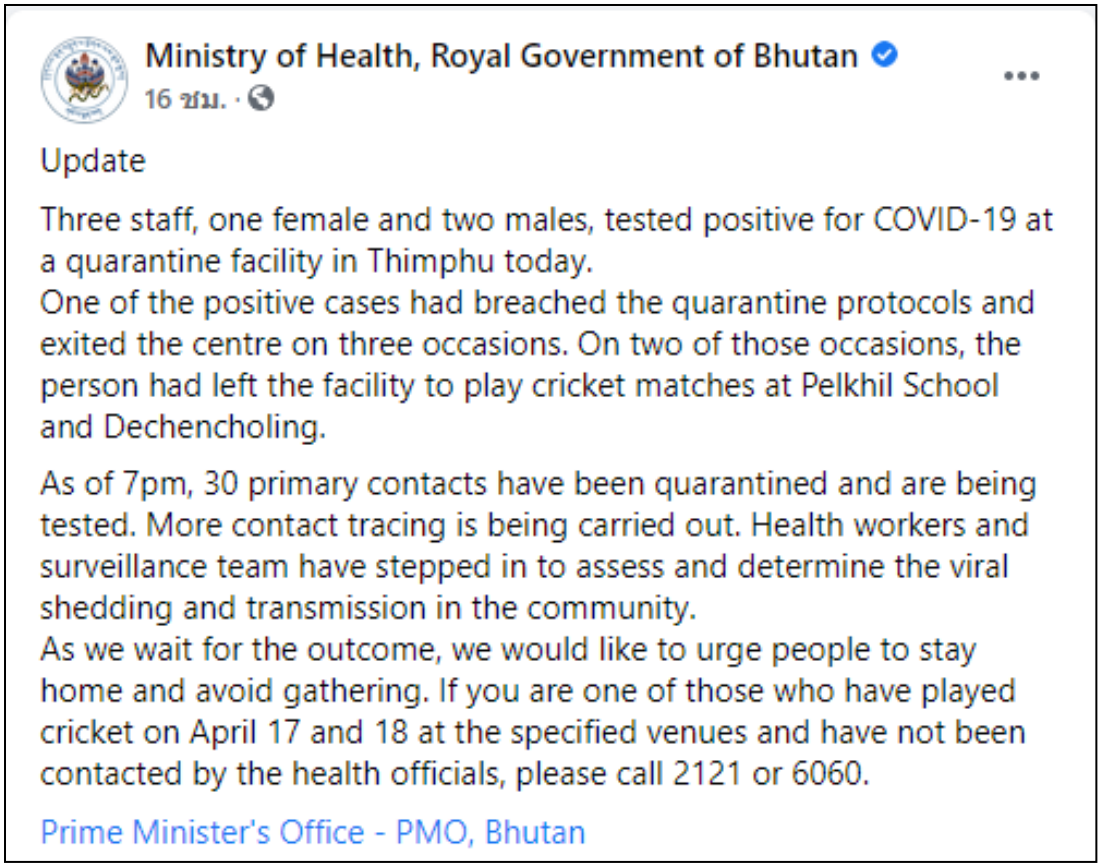
tracing flu samtse - Microsoft E

sl.no.	Name	cid_no	Contact	Age/ Sex	Present address	Place for test	Date of test
1	Chenga Dawa	11514000463	17289802	38/M	SCOE	flu clinic, Samtse	tested on 18.04.2021
2	Choley Tamang	11213001024	17110678	65/M	Daragon	flu clinic, Samtse	tested on 18.04.2021
3	Tilak Bdr Ghalley	11204001974	77215816	39/M	Mechetar	flu clinic, Samtse	tested on 18.04.2021
4	Ruden Tamang	11211000665	77210220	39/M	Gairigon	flu clinic, Samtse	tested on 18.04.2021
5	Reeta Bdr Ghalley	11204002453	77215816	28/M	Buduney	flu clinic, Samtse	tested on 18.04.2021
6	singye la	11510001236	17972471	62/M	AWP Colony	flu clinic, Samtse	tested on 18.04.2021
7	Dawa Dema	11604002275	17398709	28/F	Bazar	flu clinic, Samtse	tested on 18.04.2021
8	Dema		77244727	59/F	Nimaling	flu clinic, Samtse	tested on 18.04.2021
9	Chandra Bdr Ghalley	11212002902	17369054	35/M	Dorpani	flu clinic, Samtse	tested on 18.04.2021
10	Khem Raj Ghalley	11213001934	77216683	30/M	Dorpani	flu clinic, Samtse	tested on 18.04.2021
11	Tshering Dorji	11203001180	17664483	42/M	Dorpani	flu clinic, Samtse	tested on 18.04.2021
12	Tenzin Wangdi	11606002125	17483408	39/M	Bazar	flu clinic, Samtse	tested on 18.04.2021
13	Bupendra Ghalley	11204000641	77283638	31/M	Dhamdhum	flu clinic, Samtse	tested on 18.04.2021
14	Neraj Tamang	11305002902	17235917	21/M	Daurpani	flu clinic, Samtse	tested on 18.04.2021
15	Pema Deki	10705001727	17661633	48/M	Devithang	flu clinic, Samtse	tested on 18.04.2021
16	Thinley Doma	10103001791	17676909	50/F	Devithang	flu clinic, Samtse	tested on 18.04.2021
17	Damcho Pemo	11002001317	17768913	52/F	Gawadong	flu clinic, Samtse	tested on 18.04.2021
18	Namgay la	12004002709	17236588	33/m	Gawadong	flu clinic, Samtse	tested on 18.04.2021
19	Nidup Dorji	11312002834	77320392	26/M	Gawadong	flu clinic, Samtse	tested on 18.04.2021
20	Yonten phuntsho	11510001242	77862018	23/m	Awp coliny	flu clinic, Samtse	tested on 18.04.2021
21	Zhenphen Norbu	11106000552	17534048	31/m	Khandothang	flu clinic, Samtse	tested on 18.04.2021
22	Karsel Dawa	10903002685	17400047	48/m	khandothang	flu clinic, Samtse	tested on 18.04.2021

tracing panbari - Mic

sl. no.	Name	Age/sex	cid_no	Contact	Present address	Place for test	Date of test
1	bumpa delma	32/f	11601001958	17720539	PPS	Panbari PHC	tested 18/04/21
2	sonam lhamo	25/f	10702000618	17596584	PPS	Panbari PHC	tested 18/04/21
3	dorji wangmo	21/f	10902000328	17838632	PPS	Panbari PHC	tested 18/04/21
4	norgay lham	24/f	11215002207	17285001	ngawang dramtoe	Panbari PHC	tested 18/04/21
5	tshering zam doya	39/f	11215002264	no	ngawang dramtoe	Panbari PHC	tested 18/04/21
6	penden zam doya	28/f	11215002328	77378721	ngawang dramtoe	Panbari PHC	tested 18/04/21
7	phub zam doya	38f	11215002197	77458143	ngawang dramtoe	Panbari PHC	tested 18/04/21
8	thinly bidha	36/f	10302002307	17533353	ngawang dramtoe	Panbari PHC	tested 18/04/21
9	namgay dem doya	29/f	11215002246	17963730	ngawang dramtoe	Panbari PHC	tested 18/04/21
10	tsheltrim doya	18/f	11215004479	17913661	ngawang dramtoe	Panbari PHC	tested 18/04/21
11	tandin om	32/f	11215002326	17936418	ngawang dramtoe	Panbari PHC	tested 18/04/21
12	tamo doya	24/f	11215002260	17351681	ngawang dramtoe	Panbari PHC	tested 18/04/21
13	zang jem doya	28/f	11215002362	77354040	ngawang dramtoe	Panbari PHC	tested 18/04/21
14	tsechu doya	50/m	11215002240	77380607	ngawang dramtoe	Panbari PHC	tested 18/04/21
15	shey mo doya	40/f	11215002256	17729500	ngawang dramtoe	Panbari PHC	tested 18/04/21
16	ugyen wangchuk	42/m	11913000497	17665583	TDLSS	Panbari PHC	tested 18/04/21
17	Dijey doya	34/f	11215002265	17680489	ngawang dramtoe	Panbari PHC	tested 18/04/21
18	rinchen namgay doya	6/m	under age	17680489	ngawang dramtoe	Panbari PHC	tested 18/04/21
19	bhuda maya newar	33/f	Dha(DCRC-28)2020	16936324	lower panbari	Panbari PHC	tested 18/04/21
20	chencho wangmo doya	20/f	11215004432	17543481	ngawang dramtoe	Panbari PHC	tested 18/04/21
21	khuchu doya	40/f	-	77219166	ngawang dramtoe	Panbari PHC	tested 18/04/21
22	budhi doya	50/f	11215002131		ngawang dramtoe	Panbari PHC	tested 18/04/21

Example of raw data from community & contact tracing from Samtse district and southern Health Unit to response COVIF-19 outbreak in south of Bhutan, volunteer had to clean data and import into COVID-19 system for more than 1,500 samples line lists per day started from 17th April 2021



Ministry of Health, Royal Government of Bhutan

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Update

Three staff, one female and two males, tested positive for COVID-19 at a quarantine facility in Thimphu today.
One of the positive cases had breached the quarantine protocols and exited the centre on three occasions. On two of those occasions, the person had left the facility to play cricket matches at Pelkhil School and Dechencholing.

As of 7pm, 30 primary contacts have been quarantined and are being tested. More contact tracing is being carried out. Health workers and surveillance team have stepped in to assess and determine the viral shedding and transmission in the community.
As we wait for the outcome, we would like to urge people to stay home and avoid gathering. If you are one of those who have played cricket on April 17 and 18 at the specified venues and have not been contacted by the health officials, please call 2121 or 6060.

Prime Minister's Office - PMO, Bhutan

On 20th April 2021, Ministry of Health, Royal Government of Bhutan updated 3 community COVID-19 cases detected in Thimphu, contact tracing more than 300 individuals were tested COVID-19 in the same day in RCDC laboratory

Conclusions

In about 2 weeks after returned home land, volunteer had been served COVID-19 Bhutan National Laboratory by using online in data and reporting. Total 12,446 samples has been tested and reported for RT-PCR. This job could help and reduce workload for laboratory staffs who work at the station especially during the outbreak (Southern border cities lockdown from 16th April 2021 and Thimphu community outbreak which has been started from 20th April 2021.

Volunteer coordinated with more than 10 health workers including nurses, doctors and sample collection team leaders from 8 sites of COVID-19 collection about sample shipment, data problem and reporting.