

Safe Management of Waste generated during the evacuation of 175 Nepalese students from Wuhan, China during the COVID-19 pandemic.

Nepal Airlines Flight No. NA 4221 WUH-KTM

Visual Report



Submitted to:

Management Division
Department of Health Services
Ministry of Health & Population
Teku, Kathmandu, Nepal

WHO Country Office Nepal
UN House,
Pulchowk
Lalitpur, Nepal

Submitted by:

Health Environment Climate and
Action Foundation (HECAF 360)
Kathmandu, Nepal

February 15, 2020

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Acknowledgement

On behalf of HECAF 360, I would like to express my sincere gratitude to Mr. Yadav Prasad Koirala, Secretary, Ministry of Health and Population for providing this opportunity to execute a project on safe management of waste generated during evacuation of 175 Nepalese Students from Wuhan, China by Nepal Airlines.

Also I am grateful to Dr. Dipendra Raman Singh, Ministry of Health and Population (MoHP); Mr. Sagar Dahal, Health Emergency Operation Center (HEOC); and Mr. Bhogendra Raj Dattel, Management Division of Department of Health Services (DoHS) for visiting us to assess our capacity and for trusting us to carry out this important and prestigious project.

In addition, I am thankful to Major Dr. Bikal Shrestha, Nepal Army, DSP. Dr. Bibek Rajbhandari, Nepal Police; and Mr Karna Bahadur Thapa, Director, Engineering Maintenance Department of Nepal Airlines for all necessary coordination in the execution of this project.

Moreover I am grateful to Dr. Sudan Panthi, National Professional Officer, WHO Country Office Nepal for accompanying us into the field at Tribhuvan International Airport and for providing us with necessary technical guidance, including field assessment, during the project. I am also grateful to Mr. Tirha Sinha, Chief Technical Advisor, GiZ for providing guidance and logistics support.

I also extend my sincere thanks to Ms. Ruth Stringer, International Science and Policy Coordinator of Health Care Without Harm (HCWH) for her valuable time for remote technical consultation.

I take this opportunity to profoundly thank Prof. Dr Prem Khadga, Director, TU Teaching Hospital; Prof. Dr. Chanda Karki, Principal & CEO, Kathmandu Medical College Teaching Hospital; and Prof. Dr. Rishi Kumar Kafle, Executive Director, National Kidney Center for their commitment to the safe management of health care waste and for providing their permission and full support for using their waste treatment facilities to disinfect the contaminated waste collected during the COVID-19 evacuation from Wuhan.

And last but not the least, I thank our HECAF 360 Team, which deserves special appreciation and thanks for their hard and sincere work to accomplish this project successfully.



Mahesh Nakarmi

Executive Director

hecaf360 Health Environment and Climate Action Foundation 360

VISUAL REPORT

on safe management of waste generated during the evacuation of 175 Nepalese students from Wuhan, China during the COVID-19 pandemic

(Nepal Airlines, Flight RA-4221 WUH-KTM, February 15, 2020)

A. Background

COVID-19 is an infectious disease caused by SARS-CoV-2, a virus closely related to the SARS virus. This virus is the cause of the 2019–20 COVID-19 outbreak, first reported in Wuhan, China on 31st December 2019. It primarily spreads between people by respiratory droplets from infected individuals when they breathe or cough, although this was not known when the pandemic first broke out. Time from exposure to onset of symptoms is generally between 2 and 14 days. Over time, scientists learned that transmission can be reduced when large numbers of people wear an effective mask over nose and mouth, wash hands frequently, maintain social distancing and cleanliness, cover mouth and nose when coughing or sneezing, and cook meat properly before eating.

COVID-19 symptoms resemble the flu and include fever, cough, and shortness in breath. Extreme cases include diverse life-threatening symptoms. Particularly in elderly people and people with chronic health conditions, the disease can develop into pneumonia, followed by respiratory infection, and death. New and puzzling extreme symptoms are still being discovered. In Nepal, figures as of February 14th 2020 are 49,053 confirmed cases and 1,381 deaths from the disease¹. Global governments and agencies recognize the pandemic as an international global health emergency. WHO has published a strategic plan for managing the pandemic, including infection prevention and control guidelines.

On February 11 in Kathmandu, the members of a national cabinet meeting decided that Nepalese citizens should be evacuated from Wuhan, China. This was the beginning of the global coronavirus pandemic, when Wuhan was the epicenter, and it was of critical importance that Nepalese citizens be removed from unsafe conditions that threatened their lives.

¹ https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200531-covid-19-sitrep-132.pdf?sfvrsn=d9c2eaf_2

B. COVID 19 Situation

1) Global COVID 19 Situation on February 14, 2020



World Health Organization

Coronavirus disease 2019 (COVID-19) Situation Report – 25

Data as reported by 14 February 2020*

HIGHLIGHTS

- No new countries reported cases of COVID-19 in the past 24 hours.
- The second death has been reported outside of China, in Japan. This individual did not have known travel history to China.
- In China, health care workers account for 1716 confirmed cases of COVID-19 including six deaths.

SITUATION IN NUMBERS
total and new cases in last 24 hours

Globally
49 053 laboratory-confirmed (2056 new)

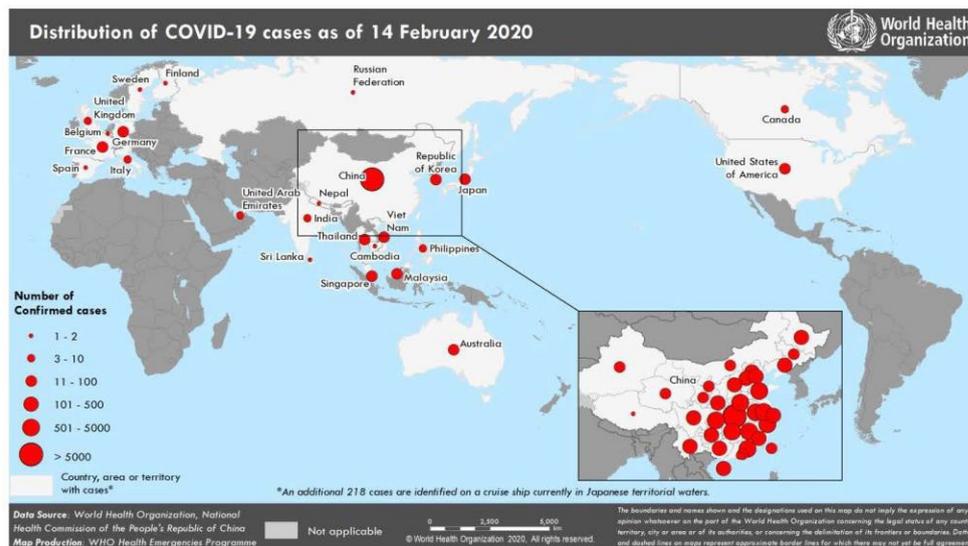
China
48 548 laboratory-confirmed (1998 new)
1381 deaths (121 new)[†]

Outside of China
505 laboratory-confirmed (58 new)
24 countries
2 deaths (1 new)

WHO RISK ASSESSMENT

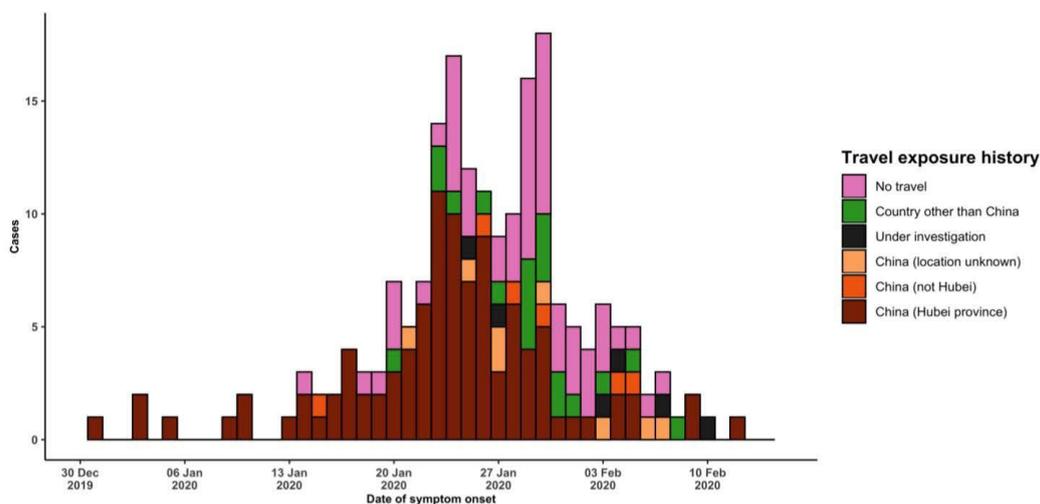
China	Very High
Regional Level	High
Global Level	High

Figure 1. Countries, territories or areas with reported confirmed cases of COVID-19, 14 February 2020



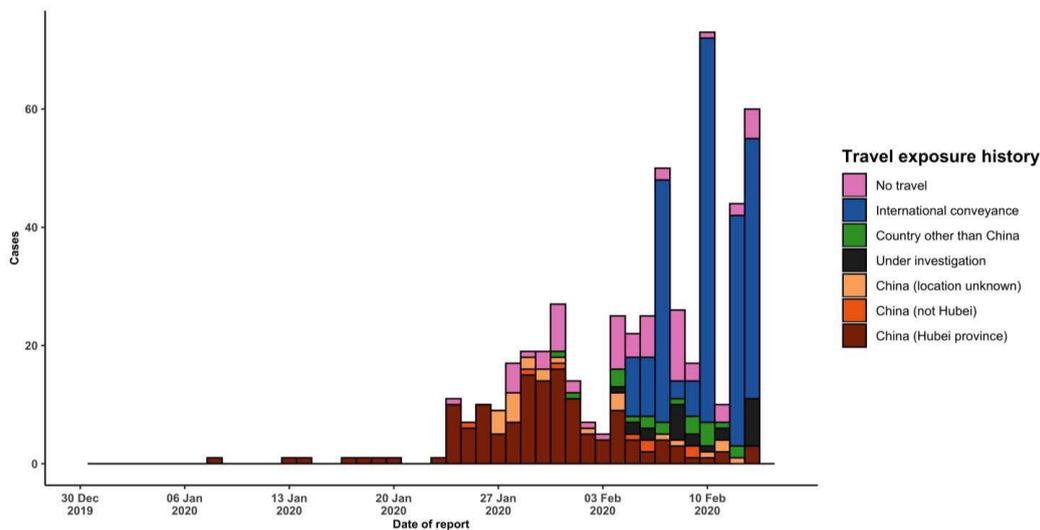
*The situation report includes information provided by national authorities as of 10 AM Central European Time
[†]As reported by China

Figure 2. Epidemic curve of COVID-19 cases (n=192) identified outside of China, by date of onset of symptoms and travel history, 14 February 2020



Note for figure 2: Of the 505 cases reported outside China, 17 were detected while apparently asymptomatic. For the remaining 488 cases, information on date of onset is available only for the 192 cases presented in the epidemiologic curve.

Figure 3. Epidemic curve of COVID-19 cases (n=505) identified outside of China, by date of reporting and travel history, 14 February 2020



2) Nepal COVID-19 Situation on February 14, 2020



Government of Nepal
Ministry of Health and Population



Health Sector Response to Coronavirus Disease (COVID-19)

Friday | 02 Falgun 2076 (14 February 2020)

On 31 December 2019, the first case of COVID-19 was reported from Hubei Province of China. This disease has spread over 24 countries outside China. As reported case fatality rate of the novel coronavirus infection compared to previous Severe Acute Respiratory Syndrome (SARS) & Middle East Respiratory Syndrome (MERS) is very low.

Current Global status on COVID-19

Global	Confirmed cases: 46997 Deaths: 1369
China	Confirmed cases: 46550 Deaths: 1368 Countries: 24
Outside China	Confirmed cases: 447 Deaths: 1 (Philippines)

No new countries reported cases of COVID-19 in the past 24 hours. Updated as of 13 February 2020, Extracted from WHO's Situation Report

Public Health Emergency of International Concern (PHEIC) has been declared on 30 January 2020; however, restriction in international traffic and trade is not recommended.

Current status on COVID-19, Nepal (*as of 14 Feb 2020, 16:00)

Total Samples Tested: 24	Tested Negative: 23	Tested Positive: 1
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The First COVID-19 Positive Case in Nepal

The only COVID-19 confirmed case of Nepal is a 31-year-old male who studies in Wuhan. He traveled to Kathmandu from Wuhan. He had non-productive cough while he was in Wuhan and was aware of the new infection that was spreading there. On 13 January 2020, after 10 days of his initial symptoms, he went for check-up at Shukraraj Tropical and Infectious Disease Hospital, Teku. Knowing his travel history the doctor kept him in the hospital for treatment and was well taken care of. His throat swab was collected at the hospital and was sent to WHO Reference Laboratory in Hong Kong for laboratory investigation. The result tested positive for COVID-19 on real-time RT-PCR assays on 23 January 2020. He was tested again for COVID-19 on 29 and 31 January 2020 at National Public Health Laboratory, Teku and both the results tested negative. One month has passed since then and is healthy. His family and contacts have not developed any symptoms suggestive of COVID-19 so far. He is expecting to return to his studies after the situation gets normal in Wuhan.

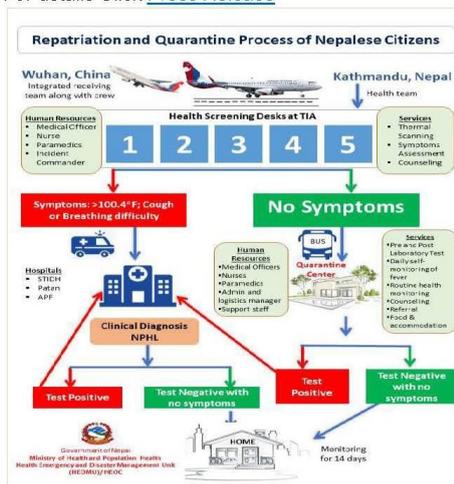
Key National Response

- **Hotline Service:** Public concerns regarding COVID-19 are being addressed through 3 hotlines (9851255839, 9851255837, 9851255834) from 8:00 to 20:00 hrs. Average number of calls received per day is 12. Sign and symptoms of COVID-19, precautions to be taken, precaution to be taken during travel and the appropriate place to go for medical consultations were the common concerns express so far.
- **Screening and Surveillance:** Temperature of travelers coming from or via China and Thailand are being individually scanned. People reporting fever, cough or

shortness of breath at are further investigated, treated, counselled and monitored on a regular basis.

Repatriation and Quarantine:

- o Orientation has been provided to all staff involved
- o Simulation exercise has been conducted.
- o Resource mapping of identified Hub & Satellite Hospitals Network has been done for responding the COVID-19.
- o Preparation has been completed for repatriation, health screening and quarantine Process. For details Click [Press Release](#)



- **Sindhupalchowk Update:** Situation is getting normal. The collected 9 samples are under investigation.

Key response and preparedness from Government: -

Health desk are operational at the main land borders crossing with China, India and also at Airports; Hospitals have prepared the Hospital Disaster Preparedness and Response Plan and isolation facilities.

Resources:

Kindly click the link below for detail resources and information.

2019-nCoV IEC	Press Release MoHP	Technical Guidance
HUB Hospitals	Audio Visual PSAs	Contacts
HEDMU/HEOC Phone: 01-4250845, Fax: 01-4250842, E-mail: heocmohp@gmail.com, Web: heoc.mohp.gov.np, fb: fb.com/HEOC		EDCD Phone: 01-4255796, Fax: 01-4100266, E-mail: ewarsedcd@gmail.com, Web: edcd.gov.np, fb: fb.com/edcdnepal

"We advise to all the public to not speculate and/or spread unfounded rumors via social media"

Visual Report on safe management of waste generated during the evacuation of 175 Nepalese students from Wuhan, China during the COVID-19 pandemic (Nepal Airlines, Flight RA-4221 WUH-KTM, February 15, 2020)



नेपाल सरकार

स्वास्थ्य तथा जनसंख्या मन्त्रालय

SitRep

#१५

कोरोना भाइरस रोग (COVID-19) सम्बन्धी स्वास्थ्य क्षेत्रको प्रतिकार्य

शुक्रबार | २ फाल्गुन २०७६ (१४ फेब्रुअरी २०२०)

COVID-19 पहिलो केस चीनको हुबेई प्रान्तबाट रिपोर्ट गरिएको थियो जुन अहिले चीनबाहिर २४ वटा अन्य देशहरूमा देखिएको रिपोर्ट गरिएको छ । रिपोर्ट भएका COVID-19 केसको मृत्यु दर (Case Fatality Rate) Severe Acute Respiratory Syndrome (SARS) को र Middle East Respiratory Syndrome (MERS) को तुलनामा निकै कम छ ।

2019-nCoV सम्बन्धी विद्यव्यापी स्थिति:

विद्यभर	पुष्टी भएका केसहरू: ४६९९७ मृत्यु हुनेको संख्या: १३६९
चीनमा	पुष्टी भएका केसहरू: ४६५५० मृत्यु हुनेको संख्या: १३६८
चीन बाहिर	अन्य प्रभावित देशहरू: २४ पुष्टी भएका केसहरू: ४४७ मृत्यु हुनेको संख्या: १ (फिलिपिन्स)

कुनै नयाँ देशहरूले पछिल्लो २४ घण्टामा COVID-19 का केसहरू रिपोर्ट नगरेको ।

विश्व स्वास्थ्य संगठनको Situation Report बाट (* १ माघ २०७६ सम्ममा)

मिति २०७६ माघ १६ गते, विश्व स्वास्थ्य संगठनले Public Health Emergency of International Concern (PHEIC) घोषणा गरेको छ । यद्यपी अन्तरराष्ट्रिय यात्रा र व्यापारमा कुनैपनि प्रतिबन्ध सिफारिस गरिएको छैन ।

COVID-19 का सम्बन्धमा नेपालको वर्तमान स्थिति:

जम्मा परिक्षण	नेगेटिभ	पोजेटिभ
२४	२३	१

(* १ फाल्गुन २०७६ सम्ममा, ४:०० बजे) सम्म

नेपालमा पहिलो COVID-19 पोजेटिभ केस

नेपालमा COVID-19 सङ्क्रमण देखिएका पहिलो र एक मात्र व्यक्ति चीनको वुहानमा अध्ययनरत एक ३१ वर्षीय नेपाली नागरिक हुन् । २०२० को जनवरी ९ मा उनी वुहानबाट काठमाण्डौ आएका थिए । वुहानमा हुँदा नै उनमा रुघाखोकी देखिएको थियो र उनी त्यस ठाउँमा फेल्दै गएको कोरोना भाइरसको सङ्क्रमणको बारेमा पनि जानकारी लिए । लक्षण देखिएको १० दिन पछि जनवरी १३ मा उनी आफ्नो स्वास्थ्य जाँच गराउन टेकु स्थित शुक्रराज ट्रिपिकल तथा सरुवा रोग अस्पताल आए । परीक्षणको क्रममा उनी केही दिन अगाडि मात्र वुहानबाट नेपाल आएको थाहा भएपछि अस्पतालमा विशेष किसिमको हेरचाह गरी उपचार शुरु गरियो । उनको खकारको नमुना (Throat swab) लाई परीक्षणको लागि हङकङ पठाइयो । जनवरी २३ मा प्राप्त प्रयोगशाला परीक्षणको नतिजा अनुसार उनी COVID-19 सङ्क्रमित भएको पत्ता लाग्यो । COVID-19 को परीक्षण राष्ट्रिय जनस्वास्थ्य प्रयोगशाला मा नै सुरु हुन थालेपछि पुन २९ र ३१ जनवरीमा उनको परीक्षण गरियो र दुवै परीक्षणको नतिजामा उनी सङ्क्रमित नभएको पाइयो । अस्पतालमा उपचार गराएर फर्केको पनि एक महिना बितिसकेको छ र उनी अहिले पूर्ण रूपमा स्वस्थ छन् । उनको परिवार र सम्पर्कमा रहेका व्यक्तिहरूमा सङ्क्रमणको लक्षण देखिएको छैन । चीनको अवस्था सामान्य बन्न थालेपछि उनी आफ्नो अध्ययन पुरा गर्न पुन वुहान फर्कने सोचमा छन् ।

मुख्य प्रतिकार्यहरू:

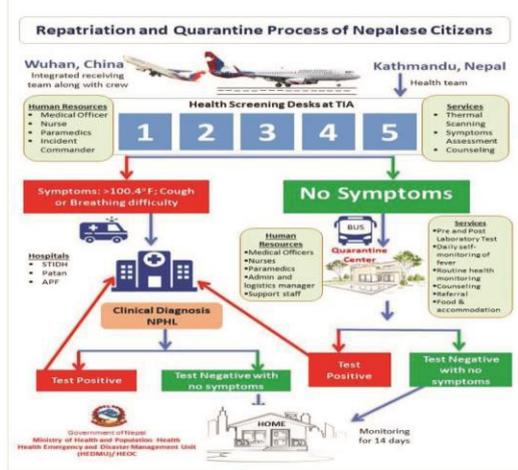
- हटलाईन सेवा: सर्वसाधारणको सुविधाका लागि कोरोना भाइरस रोग तथा सो को निदान एवम् उपचार सम्बन्धी जानकारी दिन बिहान ८:०० बजे देखी बेलुका ८:०० बजे सम्म संचालनमा रहेका तीन वटा हटलाईनमा दैनिक सरदर १२ कलहरू प्राप्त हुने गरेका छन् ।

"सामाजिक सन्जाल एवम आम सन्चार माध्यमबाट तथ्यपरक र यथार्थ सन्देशहरू प्रसारण गरिदिनुहुन अनुरोध छ ।"

- स्क्रिनिङ तथा निगरानी: त्रिभुवन अन्तराष्ट्रिय विमानस्थल मार्फत नेपाल भित्रिने सम्पूर्ण यात्रुहरूलाई थर्मल स्क्यानर मार्फत ज्वरो मापन गर्ने; मापदण्ड (>100°F) भन्दा माथि ज्वरो, रुघाखोकी र स्वासप्रश्वासमा अपठ्यारो भएका बिरामीहरूको टेकु अस्पतालमा जाँच गरी आवश्यक उपचार, प्रयोगशाला परिक्षण, परामर्श दिने गरीनुका साथै निगरानीमा राखे गरीएको छ ।

चीनबाट नेपाल आउने नेपाली नागरिकको व्यवस्थापन:

- संलग्न सबै कर्मचारीहरूलाई अभिमुखीकरण तालीम सम्पन्न ।
- घटना परिदृश्य अभ्यास सम्पन्न गरीएको छ ।
- अस्पतालहरूको पूर्व-तयारीको सुनिश्चित गरियो ।
- यस कार्यमा आवश्यक स्वास्थ्यकर्मी तथा स्वास्थ्य सामग्रीहरूको सम्पूर्ण व्यवस्था मिलाइएको छ ।
- नेपाली नागरिकलाई चीनबाट नेपाल ल्याउनका लागि हवाईजहाज, विमानस्थल तथा क्वारेन्टाईन केन्द्रमा स्वास्थ्य सुरक्षा एवं स्वास्थ्य हेरचाह सम्बन्धी सम्पूर्ण व्यवस्थापनको तयारी पुरा गरीएको छ । विस्तृत: प्रेष विज्ञप्ति



प्रदेशबाट COVID-19 सम्बन्धी गरिएका तयारी तथा प्रतिकार्यहरू:-

- चीन तथा भारतसँगका मुख्य सिमा नाकामा हेल्थ डेस्कको स्थापना गरिएकोछ; अस्पतालहरूले अस्पताल विपद पूर्वतयारी तथा प्रतिकार्य योजना तयार पारेका छन् ।

COVID-19 सम्बन्धी श्रोत एवं सामग्रीहरू:

2019-nCoV IEC	Press Release MoHP	Technical Guidance
HUB Hospitals	Audio Visual PSAs	Contacts
HEDMU/HEOC Phone: 01-4250845, Fax: 01-4250842, E-mail: heocmohp@gmail.com, Web: heoc.mohp.gov.np, fb: fb.com/HEOC		EDCD Phone: 01-4255796, Fax: 01-4100286, E-mail: ewarsedcd@gmail.com, Web: edcd.gov.np, fb: fb.com/edcdnepal

C. The Project

a) Background

On February 15, 2020, 175 Nepalese students were repatriated by Nepal Airlines on Flight No RA-4221 WUH-KTM in a 264-seat airbus 330-200 series aircraft. Understanding the risk that waste generated on the evacuation flight from Wuhan to Kathmandu posed to anyone who came in contact with it—from passengers to flight crew, and subsequently to waste handlers and the general public—the Nepalese Ministry of Health and Population requested that the technical team of Health Environment and Climate Action Foundation (HECAF360) take on the responsibility of managing all waste. It was essential to contain the virus during and after the evacuation flight, in case any of the 175 passengers were infected with COVID-19. HECAF 360 accepted this responsibility with pride and completed it with great care.

b) Objectives

The main objective of this project was to prevent exposure to COVID-19 by aircraft crew, other airline staff, waste workers, passengers, and the general public through the proper disposal of potentially infectious waste generated during the evacuation flight. But the protocols established during the flight could serve as a model for handling waste on additional evacuation flights.

The specific objectives of the project were to:

1. Develop an overall waste management plan, from segregation to final disposal for the waste generated during evacuation flights, including protocols for Personal Protective Equipment (PPE)
2. Collect and store the waste safely before disinfection
3. Disinfect the waste using non-burn technology (autoclaves)
4. Carry out fail-safe execution of the plan to ensure public health and worker safety

c) Plan and Procedure: Safe disposal of waste generated during the evacuation flight from Wuhan to Kathmandu



d) Team: HECAF 360 Technical Team responding to COVID 19

S.N.	Name	Designation	Organization	Role
1.	Mahesh Nakarmi	Executive Director	HECAF 360	Team Leader
2.	Shrawasti Karmacharya	Sr. Program Officer	HECAF 360	Project Coordinator
3.	Prerana Dangol	Program Officer	HECAF 360	OHS Coordinator
4.	Bimala Dumar	Program Coordinator	HECAF 360	Supervisor / Data Recorder
5.	Deepak Adhikari	Program Coordinator	HECAF 360	Supervisor / Data Recorder
6.	Ekta Thapa Magar	Program Associate & Bio-Med Professional	HECAF 360	Supervisor/ Data Recorder / Autoclave Validator
7.	Sujata Singh	Program Associate	HECAF 360	Supervisor / Data Recorder
8.	Priza Poudel	Program Associate	HECAF 360	Supervisor / Data Recorder
9.	Ashish Rauniyar	Program Assistant	HECAF 360	Supervisor / Data Recorder
10.	Neeraj Bikram Shah	Admin Coordinator	HECAF 360	Logistic Coordinator
11.	Gyanendra Raj Shrestha	Logistic Assistant	HECAF 360	Transportation Supervisor
12.	Gyane Budhathoki	Driver	HECAF 360	Driver
13.	Ranjit Singh	Engineer	JHS Analytical	Bio Medical Engineer
14.	Bishnu Khatiwada	Autoclave Operator	KMC Teaching Hospital	Autoclave Operator / Waste Handler
15.	Anil Rai	Autoclave Operator	Tilganga Institute of Ophthalmology	Autoclave Operator / Waste Handler
16.	Anjan Shrestha	Autoclave Operator	Kathmandu Model Hospital	Autoclave Operator / Waste Handler

17.	Krishna Timilsina	Autoclave Operator	National Kidney Center	Autoclave Operator / Waste Handler
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Visual Report on safe management of waste generated during the evacuation of 175 Nepalese students from Wuhan,

18.	Dinesh Chaudhary	Autoclave Operator	Health Environment & Climate Action Foundation (HECAF360) National Kidney Center	Autoclave Operator / Waste Handler
19	Ganesh Lama	Autoclave Operator	Free Lancer Hospital	Autoclave Operator / Waste Handler

HECAF360's COVID-19 Response Team



e) Logistics: Allocation of bio hazard containers at various collection points

The list below shows the details of containers placed on the aircraft, and in the ambulances and buses in which passengers were transported to quarantine.

Container Number	Location of container	Remarks
COVID-19 (1-4)	Aircraft	Inside the aircraft near the serving area
COVID-19 (5-9)	Ambulance	BA.17.CHA 2563, BA.17.CHA2561, BA.17.CHA 2562, BA.17.CHA6221, BA.17.CHA2560
COVID-19 (10-15)	Bus	BA.1.PA 1112, BA.1.PA 1139,BA.1.PA 1022,BA.1.PA 925, BA.1.PA 991,BA.1.PA 917
COVID-19 (16-65)	Runway	Outside the aircraft where it was parked.
COVID-19 (66-75)	Runway back up	Used for additional waste of seat covers, plastics, and other waste generated inside the aircraft

D. Project Accomplishments

Recognizing the risk of spreading the new coronavirus, whose nature was unknown at the time, HECAF 360 prepared a plan that includes all safety precautions. HECAF 360 began planning this project by consulting with all stakeholders, including the Nepalese Ministry of Health and Population, Nepal Army, Nepal Police, Civil Aviation Authority of Nepal, Nepal Airlines, Kathmandu Metropolitan City, as well as several hospitals in Kathmandu. Based on the discussions held, a plan was prepared that covered every step, from collection of waste generated to final disposal, and including messaging and signage all through the process.

Specific logistics included specs for PPE, bio hazard containers, disinfectants, etc. These materials were arranged for by HECAF 360. Those protected by PPE included the entire HECAF 360 waste management team, who were protected by full sets of PPE, including overalls, N95masks, surgical masks, double pairs of gloves, shoe covers, face shields, etc. Other workers were protected by PPE deemed to be effective for their roles.

Training on waste handling of waste and all protocols was provided to all involved

Visual Report on safe management of waste generated during the evacuation of 175 Nepalese students from Wuhan, China during the COVID-19 pandemic (Nepal Airlines, Flight RA-4221 WUH-KTM, February 15, 2020)

personnel, for instance, Aircraft Crew, Emergency Medical Technicians, drivers of ambulances and buses used to transport passengers, and more.

On February 15, 2020, the evacuation operation started at 3 am, when Nepal Airlines Flight No. 4221 WUH-KTM landed at Tribhuvan International Airport in Kathmandu. After landing, passengers were screened as they exited the aircraft. Passengers were requested to drop their waste into the bio hazard containers located outside the aircraft. When the containers were 3/4 full, they were tightly sealed and the outer surfaces were decontaminated.

After all passengers had been evacuated from the planes and buses and transported to quarantine, the bio hazard containers were transported, using all precautions, to three hospitals for disinfection in their autoclaves. The hospitals—TU Teaching Hospital, National Kidney Center, and Kathmandu Medical College Teaching Hospital—have the best waste management treatment facilities of Kathmandu's hospitals. HECAF 360 facilitated the design and implementation of health care waste management at all three hospitals.

At the hospital waste treatment centers, the contents of the bio hazard containers were disinfected using autoclave non-burn technology, rendering it safe to handle. HECAF 360 analyzed its composition and found it to be 26.7 % organic and 73.3 % non-organic. It was then sent to municipal landfill, in collaboration with Kathmandu Metropolitan City.

E. Project Execution Process: Visual Report

What follows in the next the next pages, that is from page 17 through 24, is a Visual Report – a graphic representation if you will – of the various procedural steps involved in preparing and carrying out the disinfection of the Nepal Airlines aircraft.

Many of the procedures were considerably involved and required a great deal of care to insure the safety of the passengers, aircraft crews, screening personnel, HECAF 360 teams and others involved in carrying out this important and historical work.

It is our hope that this approach will facilitate your understanding of the magnitude and importance of this assignment.

E.1 PREPARATION: MEETINGS, OBSERVATION VISITS ETC.....



Photo E.1.1 Meeting held at MoHP under the chairmanship of Secretary of MoHP Mr. Yadav Prasad Koirala



Photo E.1.2. HECAF 360 presented best practices during the meeting at MoHP



Photo E.1.3. Meeting attended by the HECAF 360 team and WHO Nepal at Nepal Airlines.



Photo E.1.4. Preparation of the aircraft prior to flying to Wuhan.



Photo E.1.5. Members of the HECAF 360 Team, Mr. Mahesh Nakarmi and Ms. Shrawasti Karmacharya, with Dr. Sudan Panthi of WHO Nepal, as they observed and guided the preparation of the aircraft.



Photo E.1. 6. The HECAF 360 team and members of WHO Nepal interacting with the cabin crew inside the aircraft and responding their queries to clarify confusion.

E.2. PREPARATION: PPE-HANDOVER, HEC MANAGEMENT



Photo E.2.1 HECAF 360 was the first organization to handover PPE to the Ministry of Health and Population as a contribution to Nepal's COVID-19 response. PPE was provided by Shanti Med Nepal, Switzerland.



Photo E.2.2 HECAF 360 handed over additional PPE to the Management Division of the Department of Health



Photo E. 2.3. Briefing to HECAF 360 Team on their roles and responsibilities.



Photo E.2.4 Internal Training for HECAF 360 Staff prior to Operation "COVID EVAC"



Photo 2.5. Locally designed Bio hazard Container by HECAF360 for management of COVID-19 waste

संकमित फोहर मात्र
INFECTIOUS WASTE ONLY

नेपाल एयरलाइन्सको फ्लाइट नं RA-4221 KTM WUH बाट उत्पादन
मएका सम्पूर्ण संकमित फोहरहरू यस ड्रममा संकलन गरी शिल गर्ने छ ।
(उब्रेको खाना, माक्स, टिस्यु पेपर इत्यादी)

पूरा व्यक्तिगत सुरक्षाका साधन लगाएका तालिम प्राप्त व्यक्तिले मात्र
यस फोहरको व्यवस्थापन गर्नुहोला ।
अन्य व्यक्तिले छोएर संकमित भएमा स्वयं जिमेवार हुनेछ ।

**This drum contains INFECTIOUS WASTE from Nepal Airlines
Flight No: RA-4221 KTM WUH and MUST REMAIN SEALED.**

The mangement of this waste is authorized only to trained
personnel with full Personal Protective Equipment (PPE).
Anyone who touches this material without PPE risks infection.
This warning makes you responsible for your personal safty.

Photo E.2.6 Label Design used for COVID-19 waste management

E.3. PREPARATION: LOGISTICS PREPARATION AT TIA



Photo E.3.1. Cleaning the bio hazard containers



Photo E.3.2. Labeling bio hazard containers



Photo E.3.3 Finishing Labelling in bio hazard containers



Photo E.3.4. Preparing testing indicators, biological spore tests, and chemical integrators



Photo E.3.5. Installing testing kits, including biological spores and chemical integrators ,inside bio hazard containers.



Photo E.3.6 Bio Hazard Containers with Testing indicators before use

E.4. TRANSFER OF BIO HAZARD CONTAINERS TO AIRCRAFT, AMBULANCES, AND BUSES



Photo E.4.1 Bio Hazard Containers ready for handover



Photo E.4.2. Briefing of Mr. Bhogendra Raj Dottel, Chief of the Management Division of DoHS, and Major Dr. Bikal Shrestha of the Nepal Army and In Charge of Screening during evacuation



Photo E.4.3. Briefing on use and handover of bio hazard containers to Mr. Karna Bahadur Thapa, Chief of the Engineering Maintenance Department of Nepal Airlines



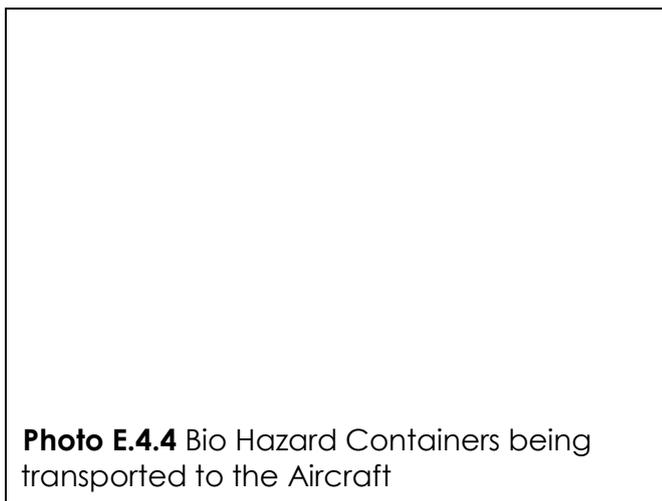


Photo E.4.4 Bio Hazard Containers being transported to the Aircraft



Photo. E.4.5. Installation of Bio Hazard Containers inside the Aircraft.

E.5. PREPARATION: DISTRIBUTION OF BIO HAZARD CONTAINERS AND BRIEFING ON WASTE MANAGEMENT SYSTEM IMPLEMENTATION DURING THE EVACUATION PROCESS



Photo E.5.1. Briefing to the bus staff on the use of bio hazard containers and the waste management process



Photo E.5.2. Installation of bio hazard



Photo E.5.3. Installation of a bio hazard container inside a bus.



Photo E.5.4. Briefing to the ambulance staff on the use of bio hazard containers and the waste management process



Photo E.5.5. Installation of a bio hazard container inside an ambulance.



Photo E.5.6. Installation of a bio hazard container inside an ambulance.

E.6. PREPARATION: DISTRIBUTION OF PPE, BRIEFING AND TRAININGS



Photo E.6.1. Distribution and briefing on PPE to the ambulance staff.



Photo E.6.2. Providing training on use of PPE



Photo E.6.3. Practical session on use of PPE (Practice on Donning and Doffing PPE)



Photo E.6.4. Ambulance staff ready for the operation



Photo E.6.5. Distribution and briefing on PPE to the bus and ambulance staff.



Photo E.6.6. Instruction by Mr. Bhogendra Raj Dattel to the bus staff.



Photo E.6.7. Ready for Action.



Photo E.6.8. Final briefing on the waste management process and coordination between actors.



Photo E.6.9. Demonstration of waste management.



Photo E.6.10. Responding to queries of the staff of Nepal Ambulance Service



Photo E.6.7. Ready for action.

E.7 FINAL PREPARATION



Photo E.7.1. Final discussion on coordination



Photo E.7.2. Ready for the operation to



Photo E.7.3. Convoy of ambulances rehearse prior to the operation.



Photo E.7.4. . Convoy of buses rehearsal prior to the operation.

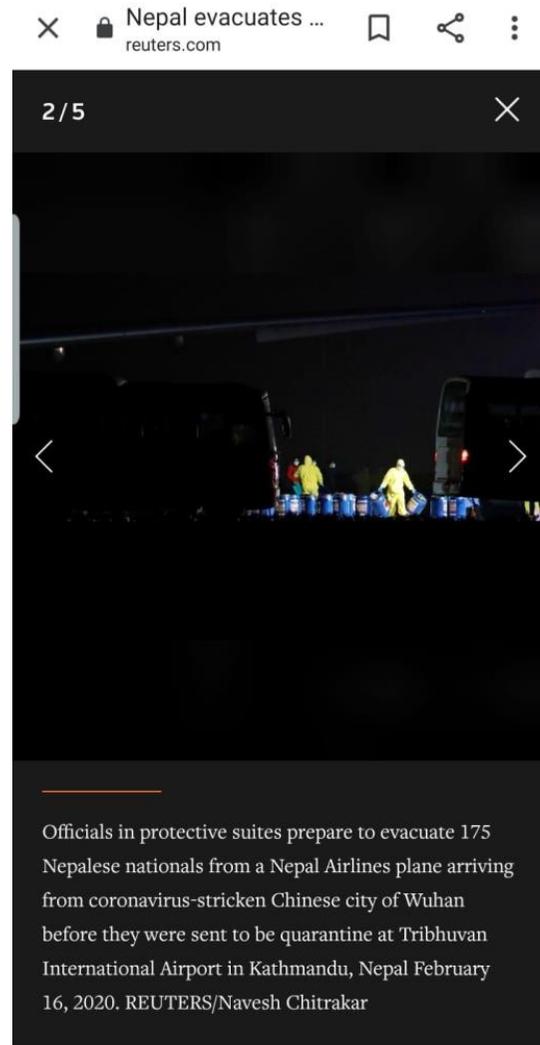


Photo E.7.5. On the way to the aircraft holding area.



Photo E.7.6. DoHS and the Nepal Army monitor the process.

E.8. DETAILS OF EVACUATION FLIGHT NA 4221



Evacuation of 175 Nepalese from Wuhan, China on February 15, 2020

- Assumption: Some passengers among the 175 passengers—but probably not all—would be infected by the new coronavirus
- The aircraft chambers were divided into two areas:
 - The front part (cockpit & business class areas) was designated as a “Clean Area” for the use of the cabin crew, airline staff, and medical team
 - The back part (economy class area) was designated as a “Dirty Area” to be used only by passengers
- Crew members were not allowed to go into the Dirty Area to serve food and water
- Food packets were left prior to boarding at each seat
- Food was provided in a paper bag to avoid generating single use plastic waste
- Clear instructions for waste management practices were communicated to passengers in written form and were also announced regularly during the flight
- Bio hazard containers were installed just outside the area of aircraft parking
- Passengers were requested via announced cues to walk over one by one to the bio hazard containers and put their waste in them
- Once a bio hazard container was two-thirds full, it was sealed and stored securely until it could be transported to a waste treatment

Visual Report on safe management of waste generated during the evacuation of 175 Nepalese students from Wuhan, China during the COVID-19 pandemic (Nepal Airlines)

E.9. AIRCRAFT LANDING AND START OF OPERATION



Photo E.9.1. Air crew member transports a bio hazard container from out of the aircraft



Photo E.9.2. Air crew member transports waste from the aircraft to the collection area



Photo E.9.3. Air Crew Member doffing their PPE after their work.



Photo E.9.4. PPE waste being sealed inside bio hazard containers

Photo E.9.5. All bio hazard containers were two-thirds full with waste generated during the evacuation.

Photo E.9.5. COVID 19 screening process of evacuees

Visual Report on safe management of waste generated during the evacuation of 175 Nepalese students from Wuhan,

E.10.DISINFECTION OF SURFACES OF BIO HAZARD CONTAINERS AT TIA PRIOR TO TRANSPORTATION TO WASTE TREATMENT CENTERS



Photo E.10.1. Bio hazard containers containing COVID-19 waste collected at the TIA



Photo E.10.1. Disinfecting the surface of bio hazard containers by spraying with



Photo E.10.1. Plastic liners were used with bio hazard containers to further prevent the spread of disease



Photo E.10.1. Safe-to-handle bio hazard containers, ready to transfer for disinfection of waste at hospital waste treatment facilities

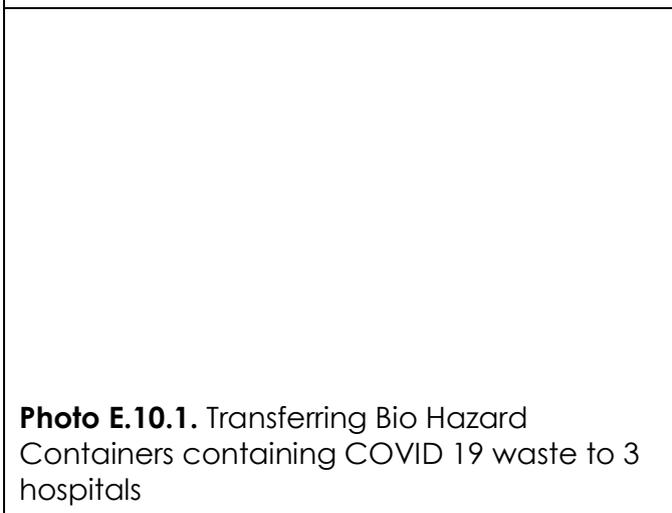


Photo E.10.1. Transferring Bio Hazard Containers containing COVID 19 waste to 3 hospitals

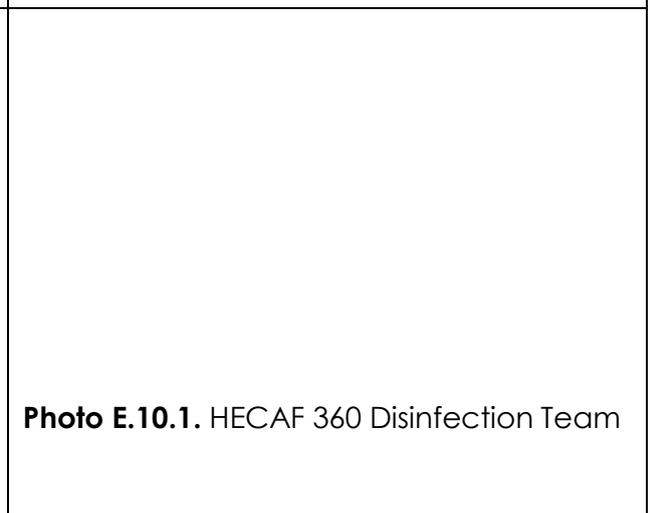


Photo E.10.1. HECAF 360 Disinfection Team

E.11. a. TREATMENT OF COVID 19 WASTE AT TU TEACHING HOSPITAL



Photo E.11.1. Loading bio hazard containers to a pre vacuum autoclave at a hospital waste treatment facility



Photo E.11.2. Unloading a bio hazard container from the autoclave



Photo E.11.3. Waste segregation after autoclaving the waste



Photo E.11.4. Composition of waste



Photo E.11.5. Result of waste disinfection shown in spores after autoclaving the waste



Photo E.11.6. Monitoring visit by Mr. Bhogendra Raj Dattel from MD/DoHs and Mr. Sagar Dahal from HEOC

E.11. b. DETAILS OF WASTE TREATMENT AT TU TEACHING HOSPITAL

Date:	Container No:	Wt. of waste (kg):	Results		Remarks:
			Behind	Front	
19-Feb-2020	28	2.145	Pass	Pass	
20-Feb-2020	03 04 07 01	19.870 1.815 2.176 3.990	Fail N/A Pass Pass	Pass Pass Pass Pass	<ul style="list-style-type: none"> Container 3 was re-autoclaved Indicator inside Container 4 was attached with plastic
21-Feb-2020	17 25 02	11.670 12.320 7.210	Fail Pass Pass	Pass Pass Pass	<ul style="list-style-type: none"> Container 17 was re-autoclaved at NKC

22-Feb-2020	49 47 50 61 42	4.655 7.234 6.530 6.150 6.070	Pass Fail Pass Pass Fail	Pass Pass Pass Pass Pass	<ul style="list-style-type: none"> Container 47 was re-autoclaved at NKC Container 42 was re-autoclaved at NKC
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E.12. A. TREATMENT OF COVID-19 WASTE AT NATIONAL KIDNEY CENTER



Photo E.12.1. Loading a bio hazard container into the pre vacuum autoclave



Photo E.12.2. Unloading a bio hazard container from an autoclave



Photo E.12.3. Waste segregation after autoclaving the waste



Photo E.12.4. Composition of waste

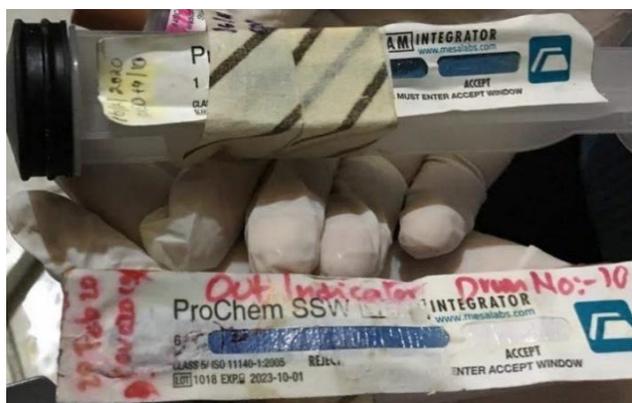


Photo E.12.5. Result of waste disinfection shown in spores after autoclaving the waste



Photo E.12.6. Monitoring visit by Mr. Bhogendra Raj Dattel from MD/DoHs and Mr. Sagar Dahal from HECAF

E.12. b. DETAILS OF WASTE TREATMENT AT NATIONAL KIDNEY CENTER

Date:	Container No	Wt. of waste (kg):	Location		Remarks:
			Rear	Front	
20-Feb-20	19	4.380	Pass	Pass	
	20	6.000	Pass	Pass	
	6	1.160	Pass	Pass	
	10	2.440	Pass	Pass	
	5	2.065	Pass	Pass	
21-Feb-20	32	3.100	Pass	Pass	
	36	5.680	Pass	Pass	
22-Feb-20	38	4.500	Pass	Pass	In Container no. 43, there was a high amount of plastic. During the autoclave process, all plastic melted and indicator spores were not found. In container no. 45, the indicator tests passed, but the spores were broken (because the container contained only food waste) so we repeated the process.
	44	1.920	Pass	Pass	
	39	4.160	Pass	Pass	
	41	3.775	Pass	Pass	
	37	4.100	Pass	Pass	
	43	9.910		Pass	
	45	8.150	Pass	Pass	
23-Feb-20	48	4.720		Pass	In container no. 48, there was a high amount of plastic. During the autoclave process, all plastic melted and indicator spores were not found.
	40	6.940	Pass	Pass	
	59	1.400	Pass	Pass	
	60	2.460	Pass	Pass	
24-Feb-20	46	5.040	Pass	Pass	
	58	3.020	Pass	Pass	
	23	3.500	Pass	Pass	
25-Feb-20	47			Pass	Container no. 45 was repeated.
	45	8.140		Pass	

E.13. a. TREATMENT OF COVID-19 WASTE AT KMC TEACHING HOSPITAL



Photo E.13.1. Loading a bio hazard container into a pre vacuum autoclave



Photo E.13.2. Unloading a bio hazard container from the autoclave



Photo E.13.3. Waste segregation after autoclaving the waste



Photo E.13.4. Composition of waste



Photo E.13.5. Result of waste disinfection shown in spores after autoclaving the waste



Photo E.13.6. . Monitoring visit by Mr. Bhogendra Raj Dattel from MD/DoHS

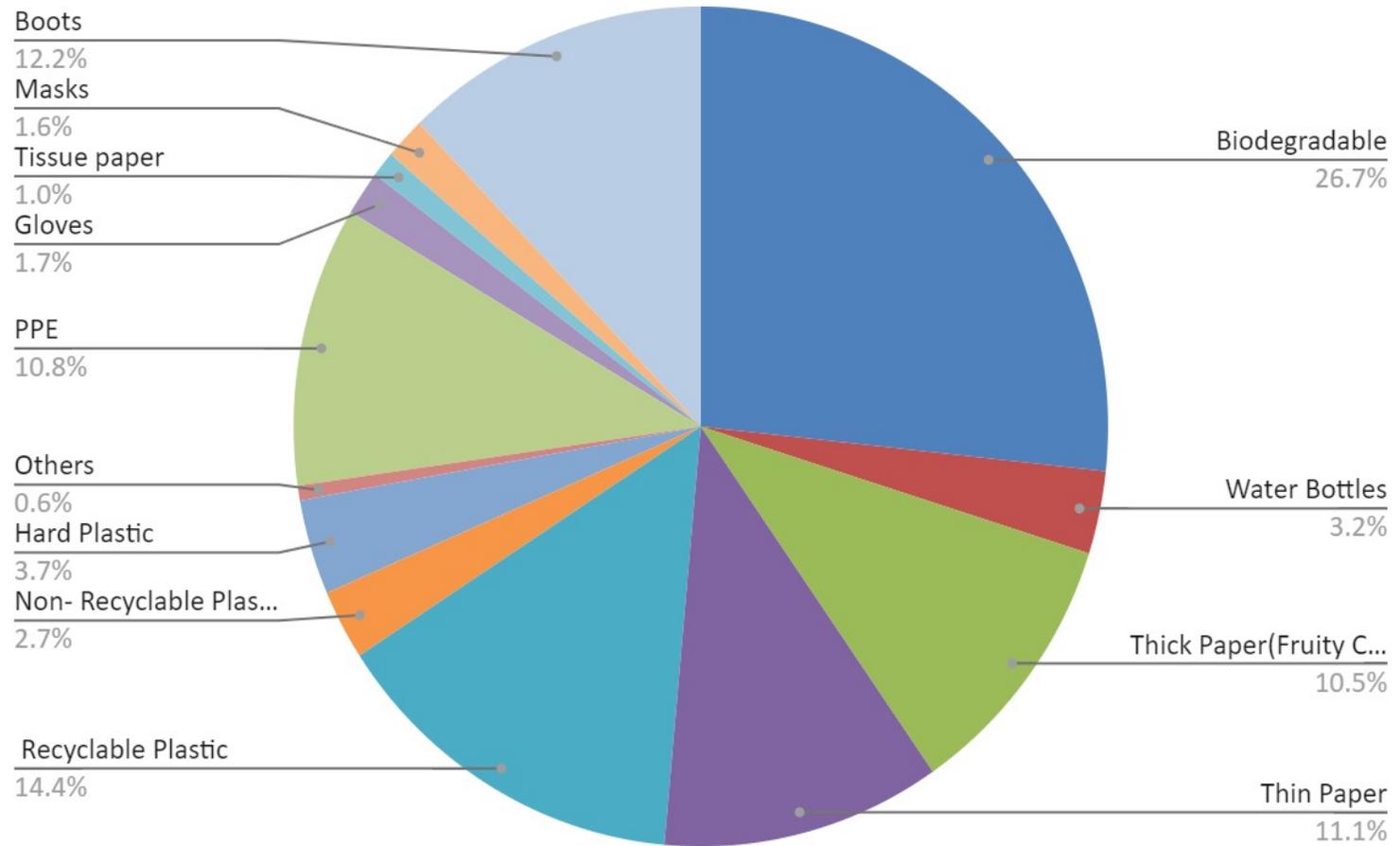
E.13. b. DETAILS OF WASTE TREATMENT AT KMC TEACHING HOSPITAL

Date:	Container No	Wt. of waste (kg):	Location		Remarks:
			Rear	Front	
19-Feb-2020	18	0.53	Pass	Pass	
20-Feb-2020	13 22 29	1.91 1.54 5.307	Pass Pass Pass	Pass Pass Pass	
21-Feb-2020	11 14 15 16 30	2.06 1.32 1.58 2.22 4.22	Fail Pass Pass Pass Pass	Pass Pass Pass Pass Pass	<ul style="list-style-type: none"> Repeat test was conducted for container no. 11 on 26-Feb as the spores were contaminated initially.
22-Feb-2020	12 65 52 53 54 57	1.27 0.75 2.15 1.78 2.705 5.29	Pass Pass Pass Pass Pass Pass	Pass Pass Pass Pass Pass Pass	
23-Feb-2020	51 55 63	1.99 1.79 4.3	Pass Pass Fail	Pass Pass Pass	<ul style="list-style-type: none"> Repeat test was conducted for container no. 63 on 26-Feb-20 as the spores were contaminated initially.
24-Feb-2020	31 33 34 62	6.11 0.32 7.32 1.88	Pass Pass Pass Pass	Pass Pass Pass Pass	
25-Feb-2020	8 21 24 27 35	2.215 6.08 10.624 1.935 5.955	Pass Pass Pass Pass Pass	Pass Pass Pass Pass Pass	

	56	8.44	Pass	Pass	
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26-Feb-2020	26	6.565	Pass	Pass	• Repeat test was conducted for container no. 11 and 63 as the spores were contaminated initially.
	11	2.06	Pass	Pass	
	63	4.3	Pass	Pass	

E.14. COMPOSITION OF TOTAL WASTE GENERATED DURING THE EVACUATION FLIGHT



E.15. SAFE DISPOSAL OF TREATED WASTE GENERATED DURING THE EVACUATION FLIGHT NA 4221



Photo E.15.1. Treated COVID-19 waste that is stored for disposal at the Kathmandu Municipal landfill.



Photo E.15.2. Carrying waste for loading into waste transportation vehicles provided by Kathmandu Metropolitan City.



Photo E.15.3. Loading waste into a waste transportation vehicle



Photo E.15.4. Waste unloaded at the transfer station before it is sent to the municipal landfill via a larger vehicle.

F. Conclusion

The waste management process was executed successfully, and all procedures were followed carefully to ensure full safety of passengers and crew during and after the evacuation flight, as well as waste handlers, other workers, and the public after the flight.

This assignment built national capacity for future evacuation flights during future periods of the COVID-19 pandemic, as well as when other pandemics arises.