Contents

Epidemiological update on COVID-19 situation in Nepal -- based on epidemiological update on 17 July 2020 07:00 hours 2
Top line summary 2
COVID-19 update 3
Incidence and trend of cases and doubling time 3
Observed doubling time for cases 7
Geographic distribution and provincial and district cumulative incidence rates 8
Age and sex distribution 11
Travel history status [Figure 10 and Table 3] 14
Contact tracing and follow up 15
Laboratory results (based on data available at EDCD) 17
Deaths and case fatality ratio (CFR) 18
Quarantine centre occupancy 19
Overall conclusion 20

Epidemiological update on COVID-19 situation in Nepal -- based on epidemiological update on 17 July 2020 07:00 hours

Top line summary

This detailed epidemiological update is based on 17,342 cases (38 deaths) of COVID-19 confirmed through RT-PCR. Core epidemiological variables for a few confirmed cases are under process currently.

Transmission pattern

So far, Nepal has been able to contain COVID-19 transmission to sporadic or clustered cases by effectively quarantining or isolating international returnees.

Although, we have seen a declining trend since 2 July, we are also now seeing a small uptick on 17 July (and following days), which should be watched closely.

Out of those confirmed COVID-19 cases from whom travel history could be elicited (64%), more than 96% had a history of foreign travel.

Bagmati province has a slightly different distribution of cases both in terms of age and sex and thereby a higher case fatality ratio.

Contact tracing has been suboptimal and has not been able to keep pace with the increasing number of cases. This should be pursued aggressively and systematically to enable Palikas to set up a structure of teams of contact tracers to have 'boots on the ground'. Without such system there is a real risk that the country may see an upsurge of cases after this initial respite.

Pending samples in the labs should be brought down to not more than 50% of daily installed capacity at end of any business day through redistribution of samples, increasing lab turnover rate or installing more capacity or a combination of all three.

Deaths

Thirty-eight persons (five female) who tested positive for COVID-19 have died. Of these, 23 persons had one or more co-morbid conditions and six persons were above 65 years of age while three were under 15 years of age.

COVID-19 update

- The COVID-19 pandemic with nearly 15 million cases and more than 600,000 deaths globally (https://www.worldometers.info/coronavirus/#countries accessed on 22 July 2020) has become an unprecedented public health challenge for all countries.
- As of 17 July 2020 (07:00 hours), Nepal has reported 17,344 cases confirmed through PCR and 39 deaths. This report is based on 17,342 cases and 38 deaths for which core data is available. [Table 1]
- All seven provinces and all of 77 districts are now affected. Five provinces are having transmission as clusters of cases, while the remaining two are classified as sporadic case transmission.

Summary of laboratory-confirmed COVID-19 cases, deaths and transmission by province

Transmission classification based on WHO definitions

Reporting Province	Total confirmed cumulative cases	Total cumulative deaths	Transmission classification*	District affected (total districts)	Date of most recent case#
Province 1	811	0	Cluster of cases	14 (14)	16-Jul-2020
Province 2	4465	5	Cluster of cases	8 (8)	16-Jul-2020
Bagmati	838	8	Sporadic cases	13 (13)	16-Jul-2020
Gandaki	1337	5	Sporadic cases	11 (11)	16-Jul-2020
Province 5	4092	10	Cluster of cases	12 (12)	16-Jul-2020
Karnali	1799	4	Cluster of cases	10 (10)	16-Jul-2020
Sudurpaschhim	4000	6	Cluster of cases	9 (9)	16-Jul-2020
National Total	**17342**	**38**		**77 (77)**	**16-Jul-2020**

- Date of last case is the date of onset or date of sample collection or date of lab report based on information available.
*Case classification is based on WHO transmission classification
No cases- provinces with no cases
Sporadic cases- provinces with one or more cases, imported or locally detected
Cluster of cases- provinces experiencing cases, clustered in time, geographic location and/or by common exposures
Community transmission- experiencing larger outbreaks of local transmission defined through an assessment of factors including, but not limited to:
- Large numbers of cases not linkable to transmission chains
- Large numbers of cases from sentinel lab surveillance
- Multiple unrelated clusters in several areas of the country/territory/area

- *All data are provisional*
- *Data updated till 17 Jul 2020 Time 07:00:00*

3

Technical Assistance from WHO ,Nepal

Table 1: Nepal COVID-19 cases by province and districts affected with date of last case in province

Incidence and trend of cases and doubling time

- Since 4 July, we had noted a decline in the daily incidence curve and a downward trend in the rolling 7=day average incidence. That trend continues this week, although we observe a very small uptick in in the rolling 7-day average on 16 July. This upward trend has continued in this week. [Table 1 and Table 2]
- Analysis of provincial epi curves revealed a similar picture. [see panel for seven provinces]
- In line with this decline in daily incidence the cumulative incidence curve seems to be flattening too. [**Error! Reference source not found.** and 4] We discuss isseus with laboratory performnace and test results later.

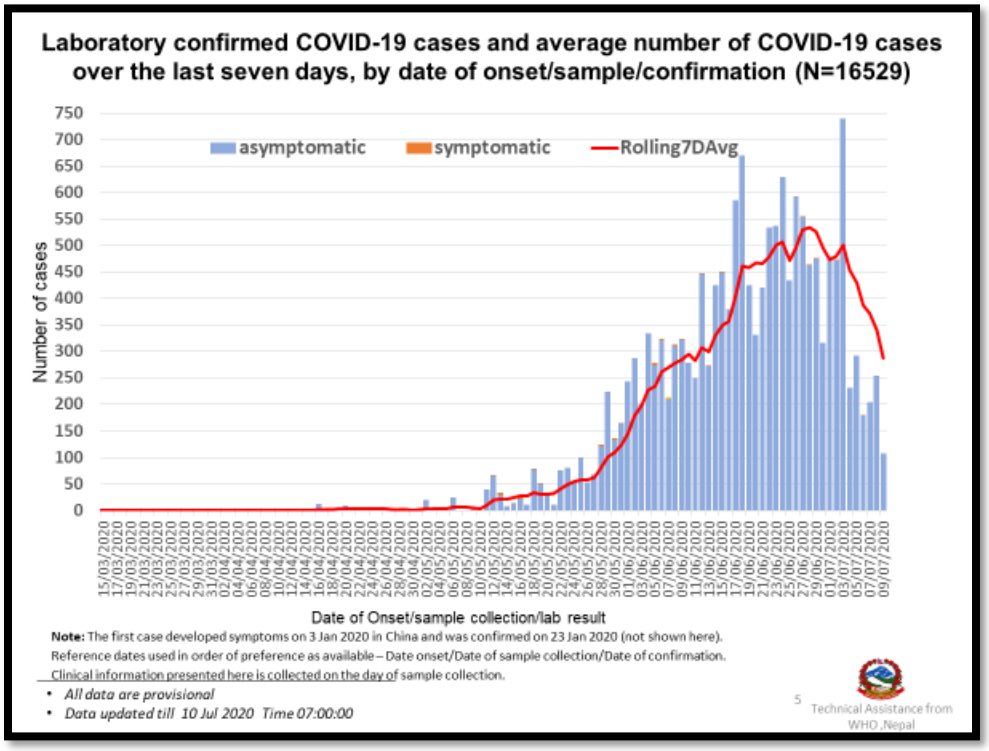


Figure 1: Daily incident cases with 7-day rolling average as on 10 July at 07:00 hours

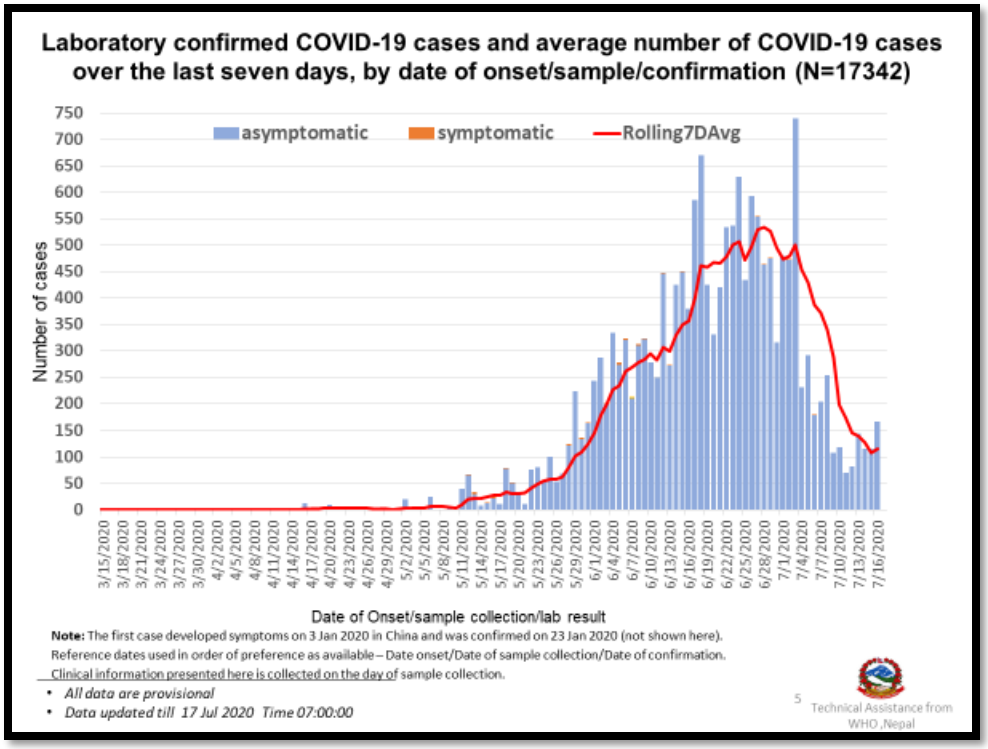
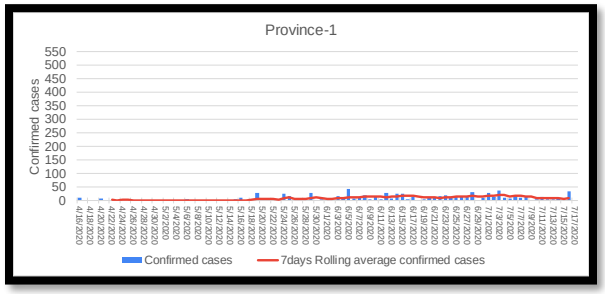
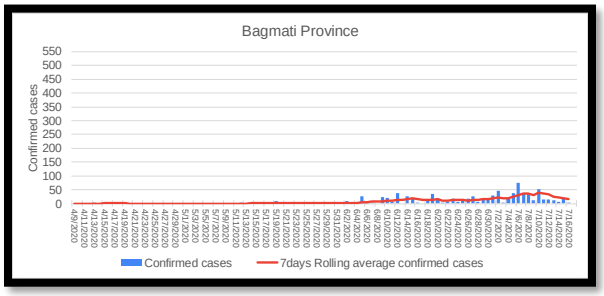
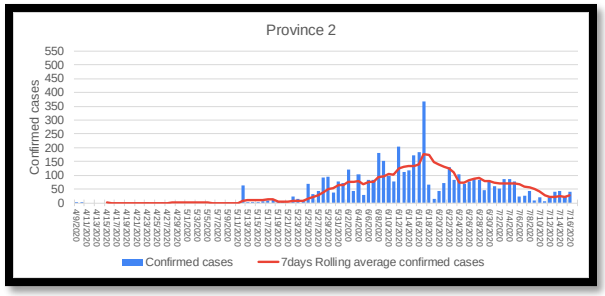


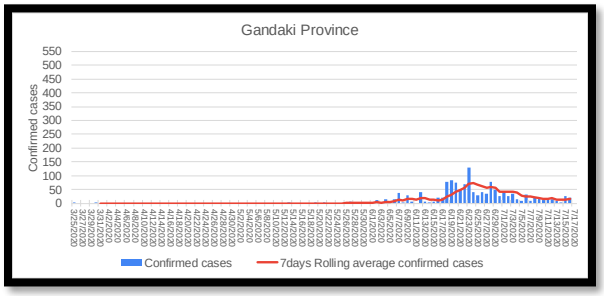
Figure 2: Daily incident cases with 7-day rolling average as on 17 July at 07:00 hours

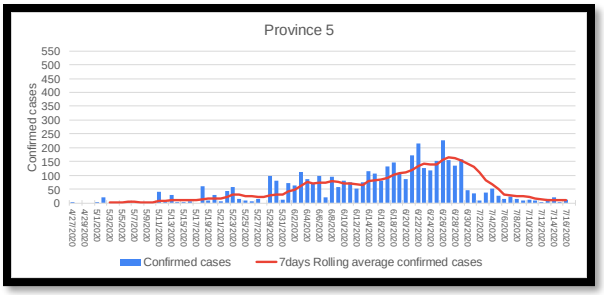
Panel for daily incident cases with 7-day rolling average by province (Panels 1-7)

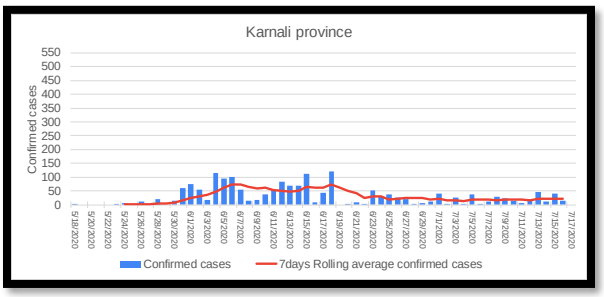


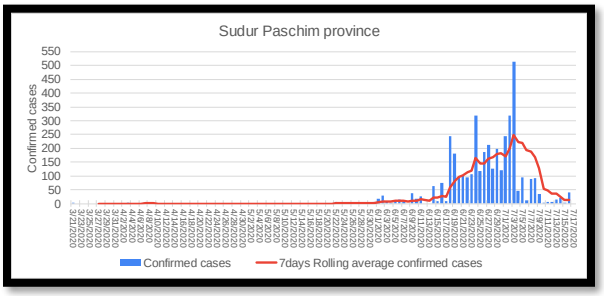







Province 5
Confirmed cases
Confirmed cases
7days Rolling average confirmed cases


Karnali province
Confirmed cases
Confirmed cases
7days Rolling average confirmed cases


Sudur Paschim province
Confirmed cases
Confirmed cases
7days Rolling average confirmed cases

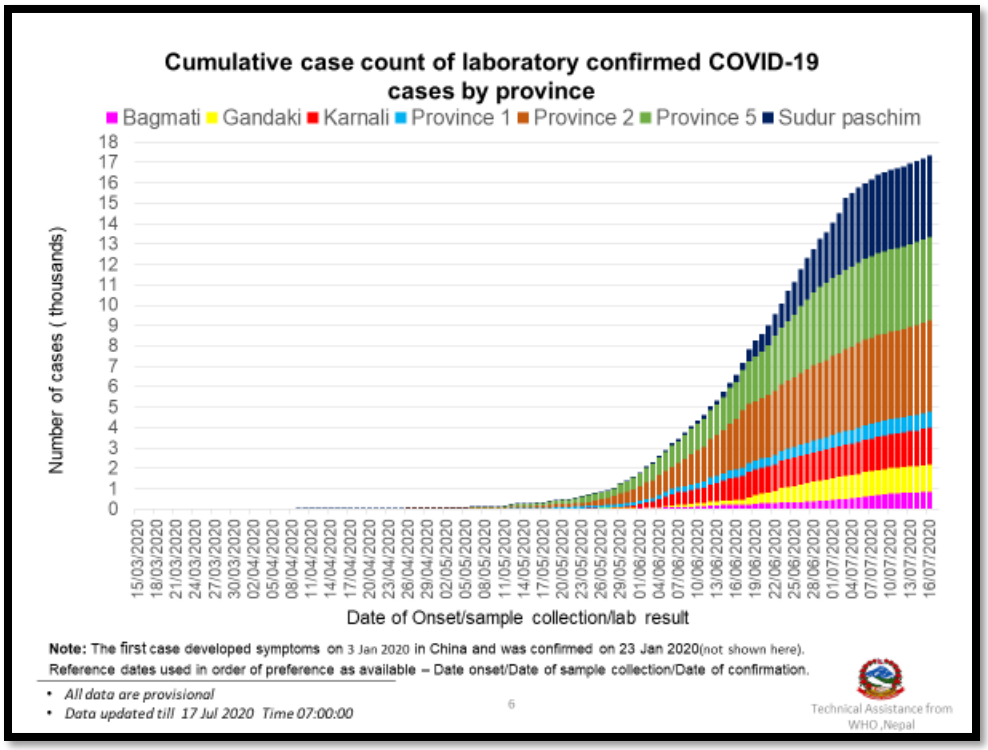


Figure 3: Cumulative incidence of COVID-19 confirmed cases by province (as of 17 July 2020)

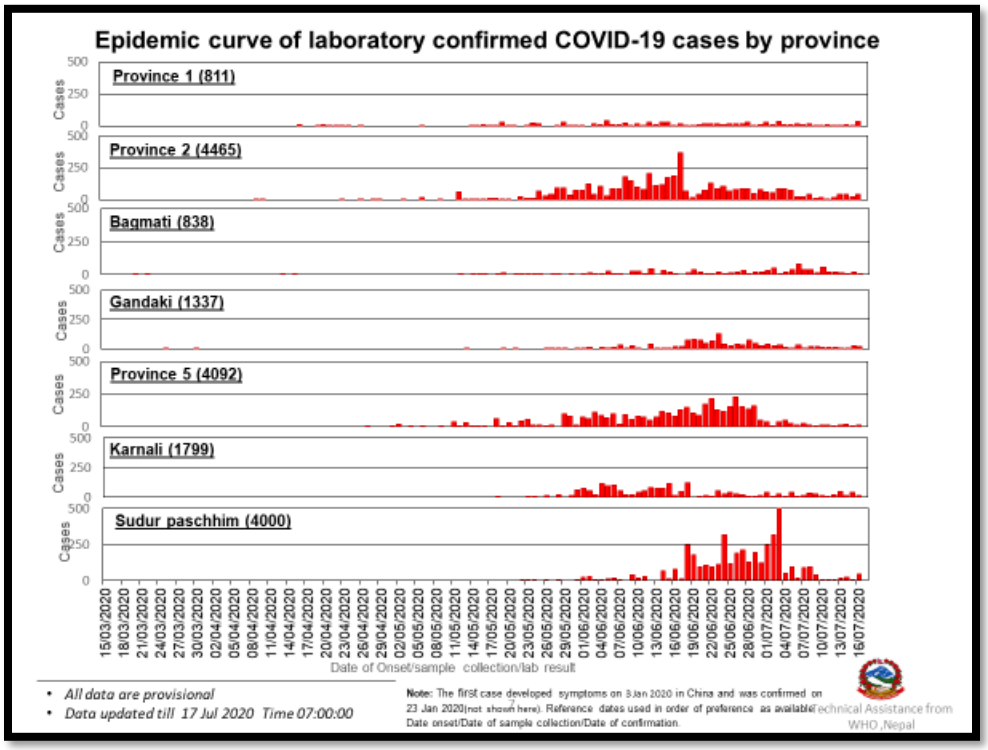


Figure 4: Panel of province wise epi-curves of confirmed COVID-19 cases

Observed doubling time for cases

- We estimated observed doubling time of cumulative cases at national level from 20 March to 17 July 2020. [Figure 5]
    - In the initial stages of the epidemic when the numbers were small, doubling time varied between 3-11 days. Between 14 May and 9 June, the observed doubling time varied between 4-8 days. However, the doubling time lengthened to 10 days from 9 to 19 June, and it has then taken 19 days from 9 June to 8 July, to double the number of cases.
    - No further doubling has yet taken place until date of report and the rate of increase has somewhat declined.

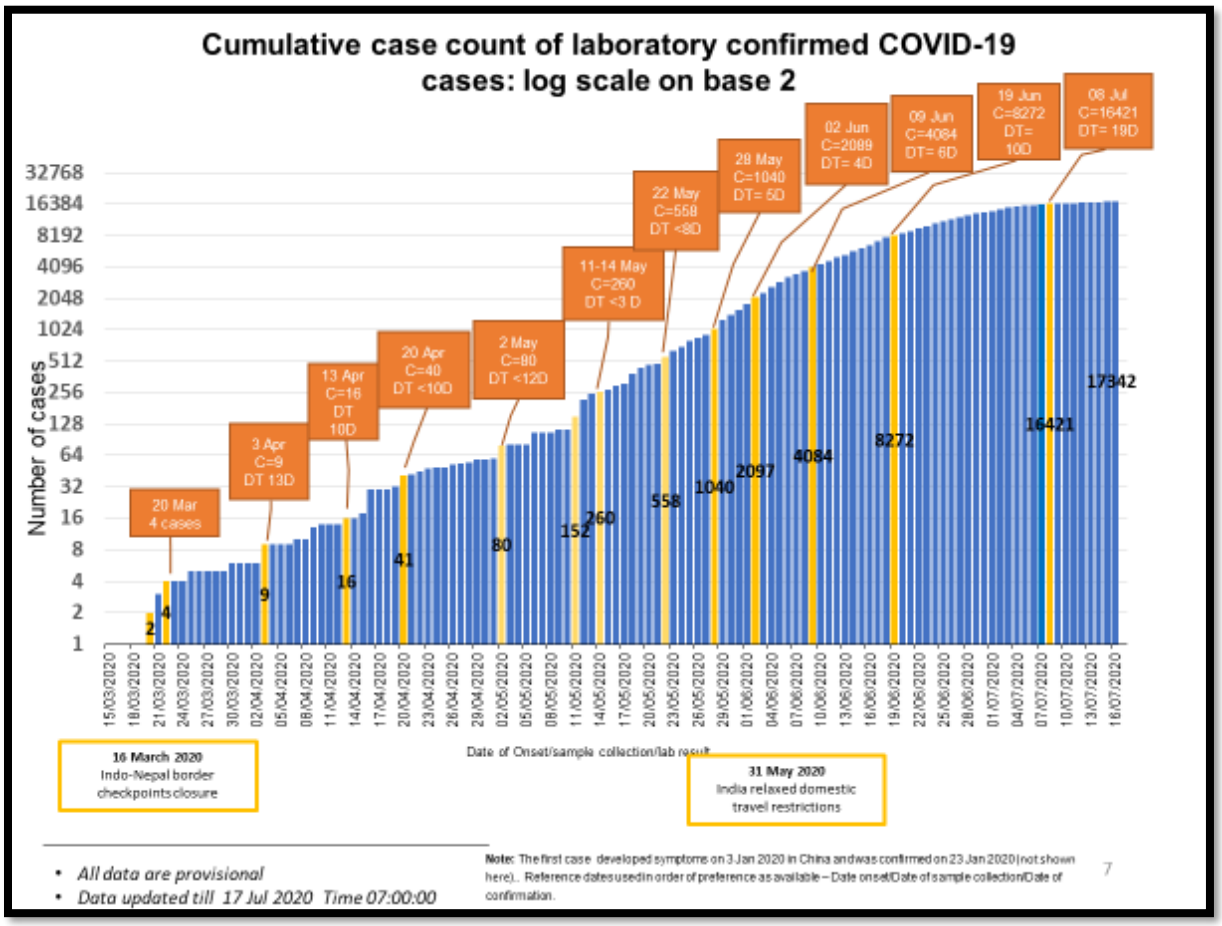


Figure 5: Observed doubling time of cumulative case count 20 March to 17 July 2020

- To our knowledge, existing mathematical models of disease trends for Nepal had not predicted this increase of doubling time (or decline in force of infection). This could have been because of the quality or completeness of data fed into the models, or because of the underlying assumptions of such models which did not match the peculiarities of COVID-19 transmission in Nepal or a combination of the two and/or other factors.
- By the same token, such models may or may not be able to predict the next wave of increase in cases as and when it comes.

- A sensitive surveillance system with fully functional and empowered contact tracing and follow-up teams would be critical now to detect the first signs of another wave and control transmission quickly. The COVID-19 response programme should anticipate such a wave and be prepared to respond, as a no-regret move, irrespective of whether such a second wave occurs or not.

Geographic distribution and provincial and district cumulative incidence rates

- The geographic distribution shown below demonstrates clustering within some municipalities.
    - In the map each dot representing 10 confirmed cases is placed randomly within municipal boundaries where the case was identified.
    - A district is shaded (affected) whenever at least one confirmed case is reported from any one municipality within the district in the last 14 days.
- The spatial distribution of cases is therefore still clustered within a few municipalities, rather than being widespread across the districts.
- If proper infection prevention and control protocols are not followed in the quarantine or isolation centres there is a real risk of spread of infection to health care workers and community through a few infective persons.

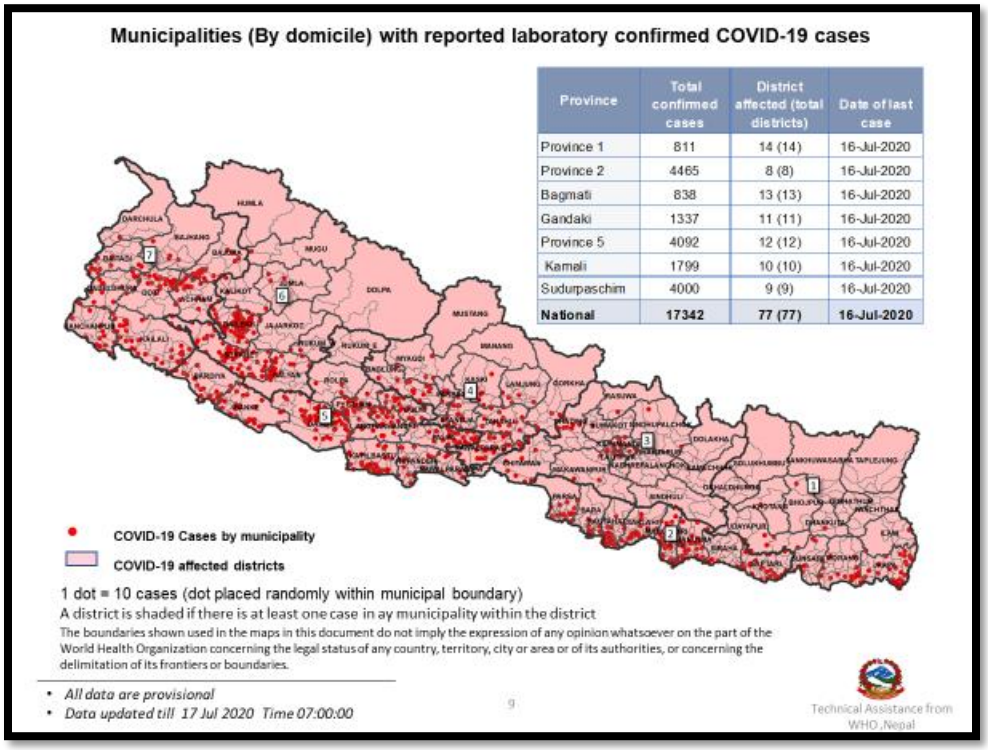


Figure 6: Distribution of cases by place of confirmation or residence

- As per data available until 17 July 2020, cumulative incidence rate (attack rate) per 100,000 population is 58.19 at national level and by province it ranged from a low of 13.12 in Bagmati to a high of 137.43 in Sudur Paschim province. [Figure 7]
- Although concerns have been expressed about the state of transmission in Bagmati including environmental isolation of SARS-CoV-2, the incident case data indicate that the present case

load is disproportionately high in western part of Nepal. We had also flagged this trend in Karnali and Sudur Paschim provinces in detailed epidemiological update in past two weeks (26 June and 3 July 2020).

- Across districts, the attack rate per 100,000 persons ranged from as low as 2 (district of Province-1) to as high as 398 in districts of Sudur Pashchim.

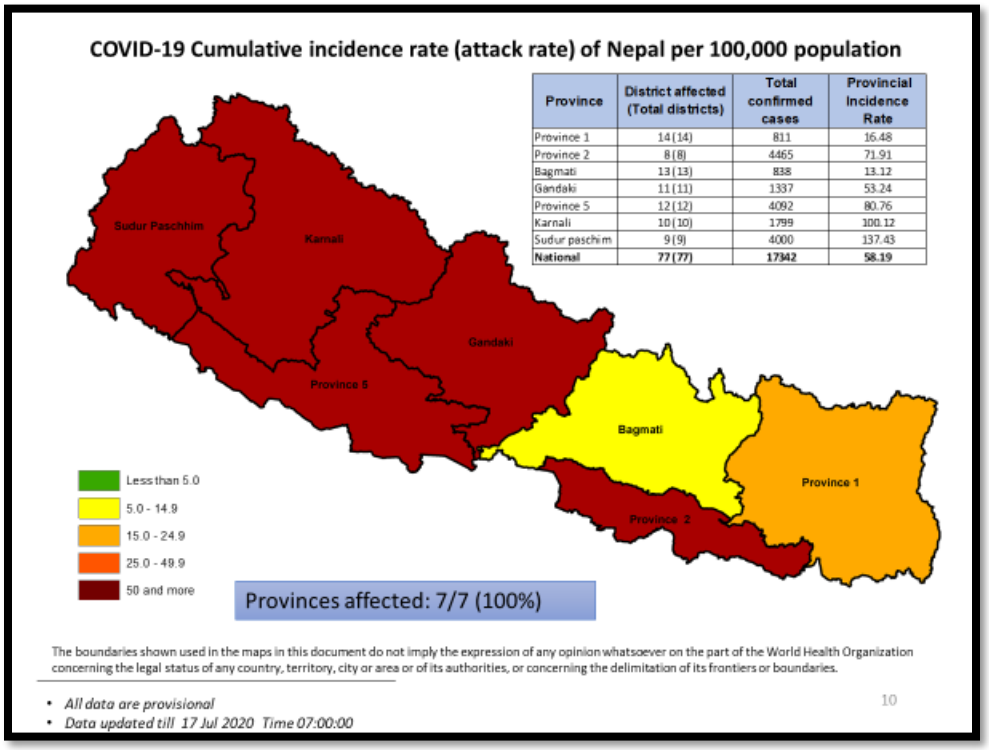


Figure 7: Cumulative incidence rate (attack rate) per 100,000 population by province

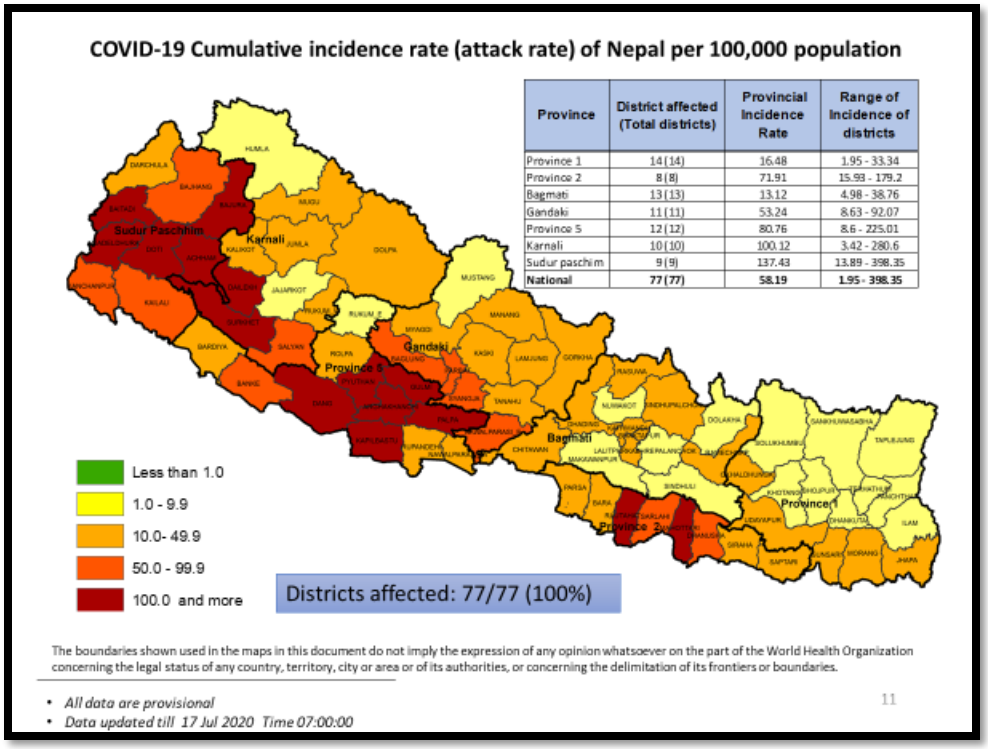


Figure 8: Cumulative incidence rate (attack rate) per 100,000 population by district

Age and sex distribution

- The age sex distribution is highly skewed towards males, who constitute 86% of the confirmed cases. Of the males again, 92% are in 15-54-year age group, indicating that these large increases in confirmed cases are occurring because of large groups of infected migrant workers (who are predominantly males in economically productive age group) returning to Nepal. [Figure 9 and Table 2]
- In absence of reliable contact tracing data to determine presence or absence of widespread community transmission, the age-sex distribution and international travel status may be useful surrogate indicators of population groups most affected by COVID-19 infection as well as community transmission.

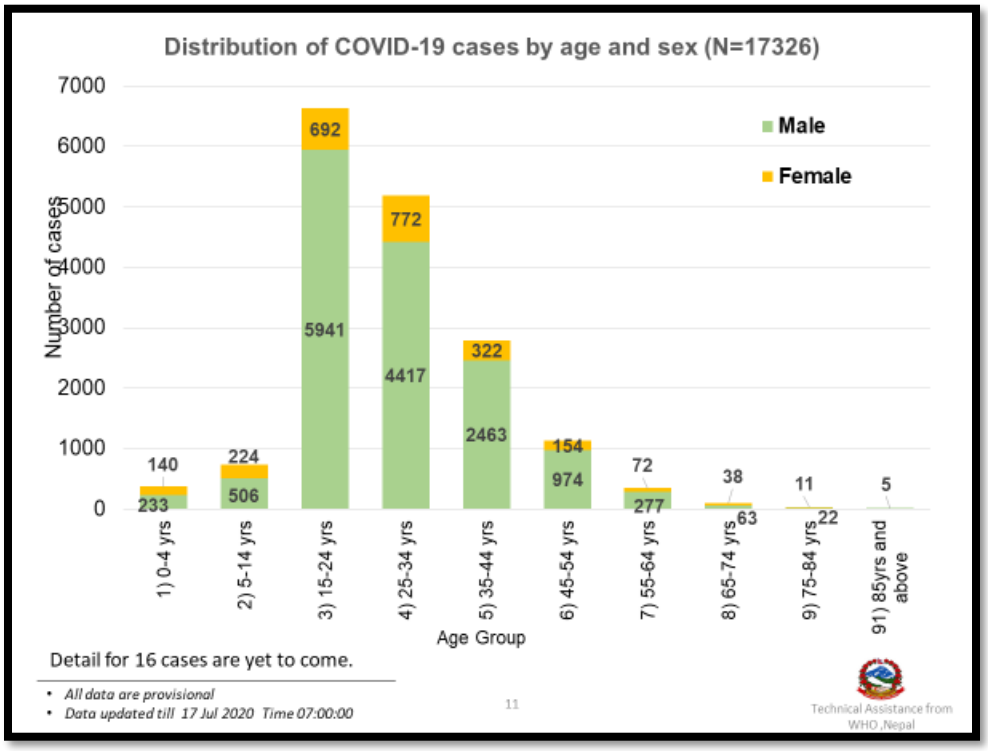


Figure 9: Age-sex distribution of confirmed COVID-19 cases, Nepal

- We explored if there are differences in male/female proportion between provinces and in the same province over time, to examine if there are differences in transmission patterns.
- Between the provinces, the proportion of males varied from a high of 94% in province-2 to a low of 68% in Bagmati province. Males constituted above 75% of cases in all the other provinces.

Distribution of COVID-19 cases by age and sex by province (N=17342)

Percentage of male among total confirmed cases: 86% (14915/17342)
Percentage of male in 15-54 year among confirmed male cases: 92% (13795/14915)

Province	Sex	Age Group											Total
		0-4 yrs	5-14 yrs	15-24 yrs	25-34 yrs	35-44 yrs	45-54 yrs	55-64 yrs	65-74 yrs	75-84 yrs	85+ yrs	Unknown	
Province 1	Female	4	9	26	48	27	15	1	3	0	0	0	134
	Male	4	21	253	213	125	40	18	3	0	0	0	677
	Total	8	30	279	262	152	55	19	6	0	0	0	811
Province 2	Female	20	41	65	89	37	19	8	2	1	0	2	284
	Male	33	201	1806	1155	697	211	51	15	3	0	9	4181
	Total	53	242	1871	1244	734	230	59	17	4	0	11	4465
Bagmati	Female	2	7	66	115	38	20	8	6	4	0	0	266
	Male	6	13	134	208	111	60	22	10	6	2	0	572
	Total	8	20	200	323	149	80	30	16	10	2	0	838
Gandaki	Female	1	12	38	57	31	13	6	7	0	0	0	165
	Male	10	22	403	382	216	103	25	6	3	2	0	1172
	Total	11	34	441	439	247	116	31	13	3	2	0	1337
Province 5	Female	31	52	140	130	66	29	17	5	4	0	0	474
	Male	31	66	1464	1073	638	266	62	10	5	0	3	3618
	Total	62	118	1604	1203	704	295	79	15	9	0	3	4092
Karnali	Female	9	15	63	73	15	11	6	2	1	0	0	195
	Male	29	32	692	468	239	112	30	1	1	0	0	1604
	Total	38	47	755	541	254	123	36	3	2	0	0	1799
Sudurpaschim	Female	73	88	294	259	108	47	26	13	1	0	0	909
	Male	120	151	1199	918	437	182	69	18	4	1	2	3091
	Total	193	239	1493	1177	545	229	95	31	5	1	2	4000
National	Female	140	224	692	772	322	154	72	38	11	0	2	2427
	Male	233	506	5941	4417	2463	974	277	63	22	5	14	14915
	Total	373	730	6633	5189	2785	1128	349	101	33	5	16	17342

- *All data are provisional*
- *Data updated till 17 Jul 2020 Time 07:00:00*

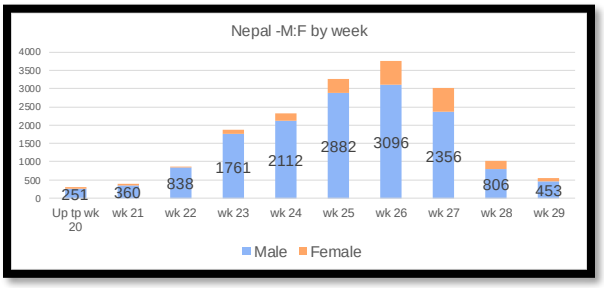
12

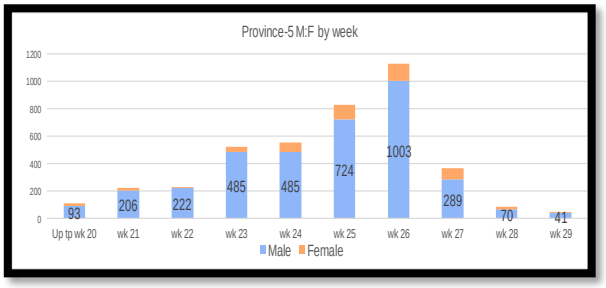
Technical Assistance from WHO ,Nepal

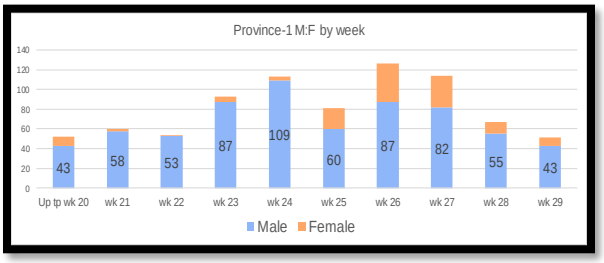
Table 2: Age-sex distribution of confirmed COVID-19 cases by provinces of Nepal

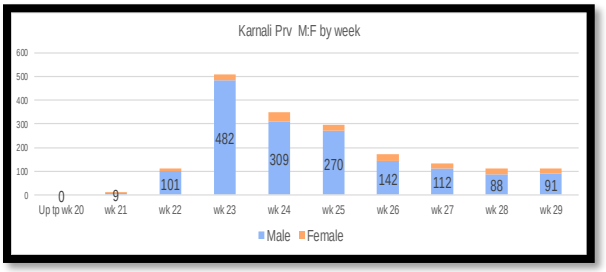
- Over time, the proportion of males decreased significantly weeks 27 and 28 in Bagmati, but not so much in other provinces. This could indicate some community level transmission in Bagmati. However, we also note that these weeks also coincided with some relaxations in international air travel with persons of both sexes landing in Kathmandu and testing positive. [Please see panel below.]
- Although we do not have gender disaggregated data for returnees, the general perception is that the gender distribution was likely different between larger number of returnees crossing over the southern land border and the smaller number of returnees flying into Kathmandu.

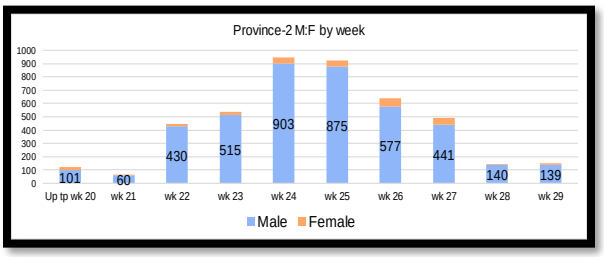
Confirmed COVID-19 cases in Nepal and seven provinces: Sex distribution by week

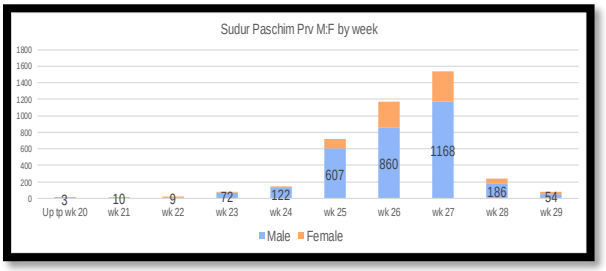


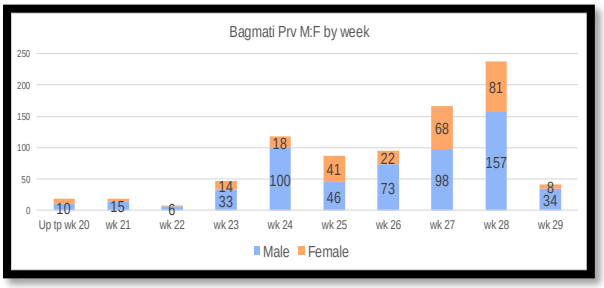


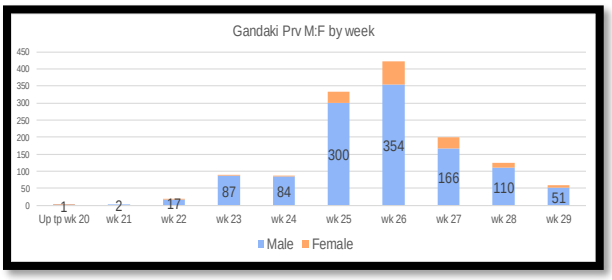












Travel history status [Figure 10 and Table 3]

- We tried to obtain history of international travel (from India as well as other countries) in the 4-6 weeks prior to confirmation from 17342 cases and could obtain it from the records and direct inquiry from 11,100 (64%) of cases.
- Overall 62% of these 64% cases had a history of international travel and no travel history could not be obtained from 36% of cases. From those in whom such history or information could be obtained, 96% (10,703/11,100)) had history of international travel which remains the same as we observed last week.
- History of international travel varied between provinces with a high of 87% in Province-1 and a low of 35% (59% with unknown travel history) in Bagmati. Of note, in Sudur Paschim province, 68% had history of international travel with 31% as unknown travel history.

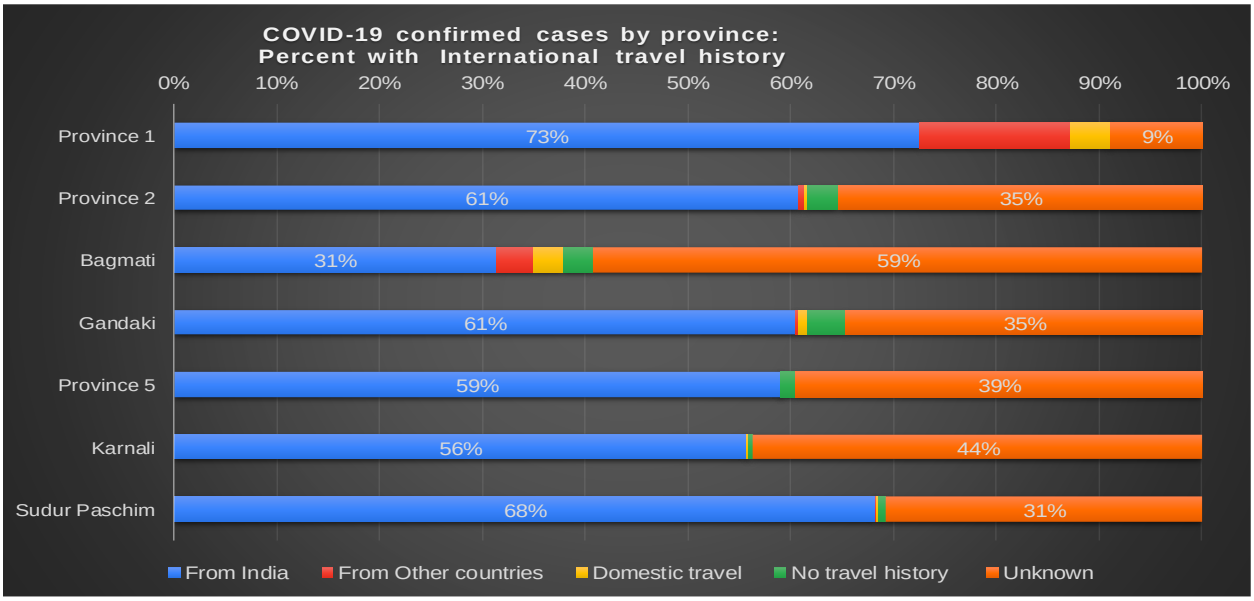


Figure 10: History (%) of travel among confirmed cases (as on 17 July 2020)

Province	From India	From Other countries	Domestic travel	No travel history	Unknown	Total
Province 1	588	119	32		72	811
Province 2	2,715	22	16	132	1,580	4,465
Bagmati	263	30	24	25	496	838
Gandaki	809	4	11	50	463	1,337
Province 5	2,414	2	2	58	1,616	4,092
Karnali	1,003		1	10	785	1,799
Sudur Paschim	2,732	2	7	29	1,230	4,000
Nepal	10,524	179	93	304	6,242	17,342
Per cent	61%	1%	1%	2%	36%	100%

Table 3: History of travel (international and domestic) among confirmed cases (17 July 2020)

Contact tracing and follow up

- As the table below shows, overall only about 6% of cases have had some form of contact tracing done and one or more contacts identified. This proportion varied widely across provinces with <1% in Sudur Paschim and nearly 80% in Province-1. [Table 4]
- More importantly, as the case numbers increased with time, contact tracing mechanisms at sub-national levels have not been able to keep pace. In March and April all cases (4 and 52) had some form of contact tracing done, but this dropped to between 2%-4% in May to July as case numbers climbed to hundreds and thousands in the provinces. [Table 5]
- Most of these initial investigations were done by central teams from EDCD with support from WHO and other partners, as well as provincial and local level teams.
- Despite the guidance from national HEOC to form 1,075 contact tracing teams (1-2-3-5 teams for different types of Palikas) and EDCD enabling log in credentials in Go.data module for data entry for each of the seven provinces, the necessary activities on the ground for systematic contact tracing have not taken place.
- We note that for the 1075 teams mentioned above, each team would need at least three sub-teams, each sub-team supported adequately with mobility and communication costs. This could be a possible gap which would need to be addressed urgently.

Contact Tracing Province-wise*

Province	Total cases	Cases with contacts identified**	% of cases for whom contacts identified	Total no. of contacts ***	Contacts per case****
Province 1	774	617	79.7	8340	14
Province 2	4331	169	3.9	1041	6
Bagmati	833	100	12.0	1753	18
Gandaki	1308	13	1.0	275	21
Province 5	4058	88	2.2	630	7
Karnali	1755	19	1.1	540	28
Sudurpaschim	3946	31	0.8	180	6
National	**17005**	**1037**	**6.1**	**12759**	**12**

* Data based on entries in Go.Data as of 16 July at 11:00
** Counts of cases who have atleast one contact entry in Go.Data
*** An individual could be counted more than once if s/he was contact of more than one cases
**** Calculated for cases for whom contacts have been identified

Table 4: Contact tracing performance by province (from Go.data module as on 16 July 2020)

Contact Tracing Province and Month Wise*

Province/ Month	Jan		March		April		May		June		July	
	Total cases	Cases with contacts identified** (% of total cases)	Total cases	Cases for whom contacts identified (% out of total cases)	Total cases	Cases for whom contacts identified (% of out total cases)	Total cases	Cases for whom contacts identified (% out of total cases)	Total cases	Cases with contacts identified (% out of total cases)	Total cases	Cases with contacts identified (% out of total cases)
Province 1	0	0	0	0	31	31 (100.0)	130	122 (93.8)	431	358 (83.1)	182	106 (58.2)
Province 2	0	0	0	0	12	12 (100.0)	585	139 (23.8)	3160	18 (0.6)	574	0
Bagmati	1#	0	2	2 (100.0)	4	4 (100.0)	37	29 (78.4)	378	46 (12.2)	411	19(4.6)
Gandaki	0	0	1	1 (100.0)	1	1 (100.0)	21	3 (14.3)	996	8 (0.8)	289	0
Province 5	0	0	0	0	0	0	520	45 (8.9)	3254	41 (1.3)	284	2
Karnali	0	0	0	0	0	0	123	11 (8.7)	1311	8 (0.6)	321	0
Sudurpaschim	0	0	1	1 (100.0)	4	4(100.0)	19	10 (52.6)	2420	16 (0.7)	1502	0
Total	**1**	**0**	**4**	**4 (100.0)**	**52**	**52 (100.0)**	**1435**	**359 (2.5%)**	**11950**	**495 (4.1%)**	**3563**	**127 (3.6%)**

* Data based on entries in Go.Data module as of 16 July at 11:00; #: Not entered in Go.Data;
** Counts of cases who have at least one contact entry in Go.Data

Table 5: Contact tracing performance by province and month (from Go.data module as on 16 July 2020)

- At present, in the absence of a vaccine or proven therapies for COVID-19, non-pharmaceutical interventions (NPI) for controlling COVID-19 control are clearly based on Test-Trace-Isolate (or Quarantine) strategy. Countries that have been able to do these NPI rigorously have succeeded in controlling the disease and vice versa.
- So far, Nepal epidemiology for COVID-19 was driven by infection in returnees. There was an easily identifiable marker for risk through history of foreign travel, especially across the southern land border. The country has done well to identify such at risk individuals and quarantining, testing and isolating such individuals promptly and has thus been able to limit disease spread to the community despite large number of returnees entering the country in asymptomatic or pre-symptomatic phase of transmission.
- However, that easily identifiable risk marker is gradually losing its utility with decreasing numbers of returnees. [Figure 13] At this juncture, it is critical that the surveillance programme is empowered to carry out contact identification, tracing and follow-up at the local levels, which has not been done efficiently, so far.
- Operationally, the first two steps of the process, namely, case investigation and contact identification would need an investigator with medical or high level of public health training to complete the investigation and distinguish between ‘close’ and ‘casual’ contacts.
- The next two steps namely contact tracing and contact follow-up for the close contacts can be efficiently done by the two- member sub-teams who should know the local community and be able to speak the local language. They should have adequate mobility and communication (mobile recharge) support.

Laboratory results (based on data available at EDCD)

- From daily PCR testing data shared by HEOC on 17 July 2020, we note that Nepal has done between 3,648 to 7,791 PCR tests daily. Significantly, while the PCR positivity proportion reached a peak of 17% on 3 July, it has come down to 2% to 3% between 11 and 17 July with a comparable intensity of testing.
- We also analysed laboratory data shared by EDCD (as of 17 July 2020) for 249,442 PCR swabs collected. This data set may not be complete for all provinces and labs. [Table 6]
- Overall, cumulative proportion of PCR positivity is 7%., varying between 14% in Sudur Paschim and 2% in Province-1. [Table 6]
- However, it is very concerning that nationally there were more than 9000 samples pending testing at different labs across the country.
- Given that the country now has an installed capacity of around 10,000 PCR tests daily, this represents a backlog of nearly one full day of installed laboratory capacity across the national lab network.
- A couple of concerning issues emerge from this analysis.
    - The laboratory data systems remain fragmented and may well misinform decision making. This should be addressed urgently, and data systems streamlined.
    - The labs should be supported to immediately test the pending specimens and monitored on an ongoing basis to ensure a lab turnaround time of 24-48 hours. Pending backlog of samples from one overloaded lab should be redistributed to other labs which have lesser load or higher capacity.

Province	PCR Swabs Collected	PCR tests Positive	PCR tests Negative	Result pending at Lab	Cumulative Per cent Positive
	A	B	C	D=A-(B+C)	F=B/(B+C)%
Province 1	34,972	790	34,182	--	2.26
Province 2	49,920	4,068	44,147	1,705	8.44
Bagmati	26,670	853	21,218	4,599	3.86
Gandaki	20,905	1,302	19,540	63	6.25
Province - 5	50,384	4,061	45,084	1,239	8.26
Karnali	36,384	1,912	34,472	--	5.26
Sudurpaschim	30,207	3,899	24,651	1,657	13.66
Total	**249,442**	**16,885**	**223,294**	**9,263**	**7.03**

Table 6: Laboratory results, pending results, and percent positivity by province (as on week of 7 July 2020): EDCD

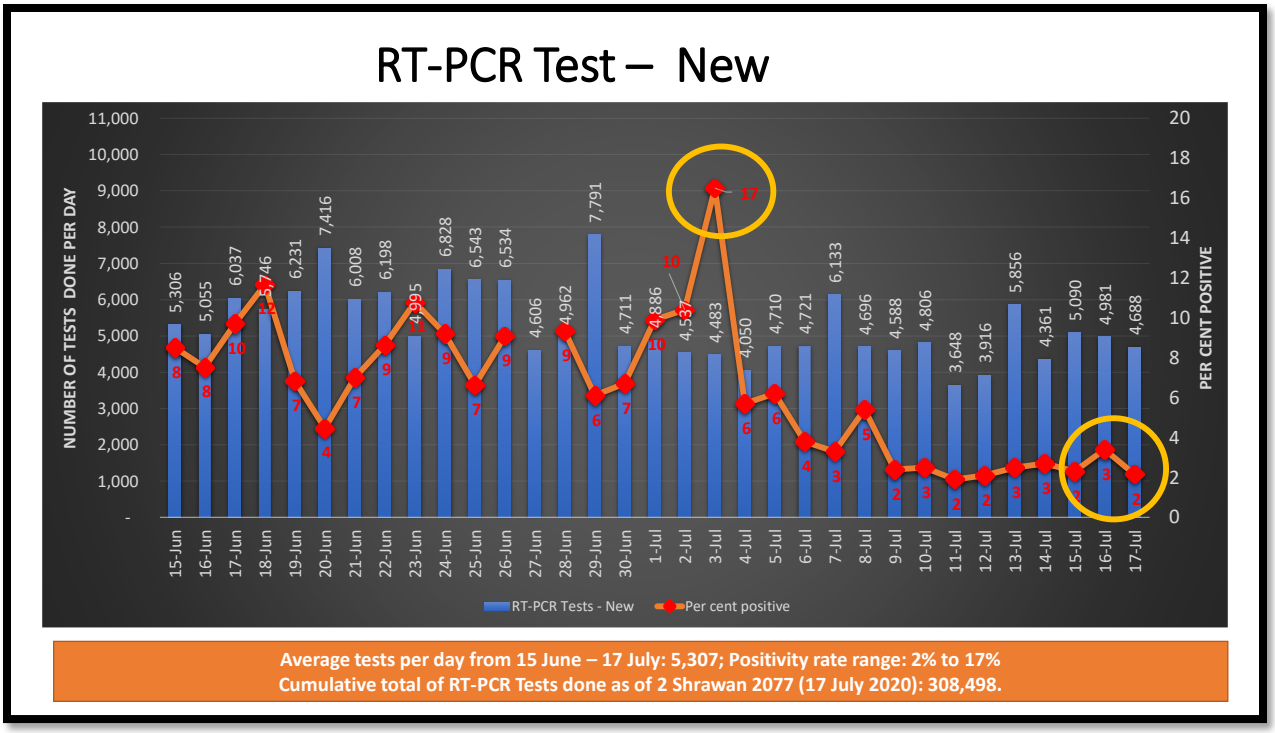


Figure 11: Daily PCR tests done 15 June – 17 July and per cent positive (Source HEOC, 17 July 2020)

Deaths and case fatality ratio (CFR)

- Thirty-eight persons (five female) who tested positive for COVID-19 have died. Of these, 23 persons had one or more co-morbid conditions and six persons were above 65 years of age while three were under 15 years of age. [Figure 12]
- Between provinces, Bagmati has the highest case fatality ratio at 1%, while, for other provinces it varies between 0% and 0.4%. However, we also note that this could be due to the age distribution of cases in Bagmati where 7% of the cases are 55 years and above, while for other provinces it varies between 2% and 4%. [Data not shown here.]

Age-specific case fatality ratio and comorbidity of deaths* in COVID-19 confirmed cases (N=17342)

Age Group	Total confirmed cases	Death (male)	Death (female)	Deaths with any known comorbid condition	Age specific case fatality ratio (%)
0-4 yrs	373	1	1	0	0.54
5-14 yrs	730	1	0	0	0.14
15-24 yrs	6633	1	0	1	0.02
25-34 yrs	5189	4	2	3	0.12
35-44 yrs	2785	6	1	3	0.25
45-54 yrs	1128	7	1	5	0.71
55-64 yrs	349	7	0	6	2.01
65-74 yrs	101	3	0	3	2.97
75-84 yrs	33	2	0	2	6.06
85+ yrs	5	1	0	0	20
Unknown	16	0	0	0	0
National	**17342**	**33**	**5**	**23**	**0.22**

COVID-19 positive lab result is temporally associated with death; causal association under investigation.
** Source:* https://covid19.mohp.gov.np/#/

- *All data are provisional*
- *Data updated till 17 Jul 2020 Time 07:00:00*

14

Technical Assistance from WHO ,Nepal

Figure 12: Age-specific case fatality ratios in lab confirmed COVID-19 cases

Quarantine centre occupancy

- Data available from Ministry of Home Affairs (https://covid19.ndrrma.gov.np/timeline/) shows there was a sharp increase in number of persons in quarantine from 21 May onwards and has started declining form 9 June, 2020. [Figure 13]

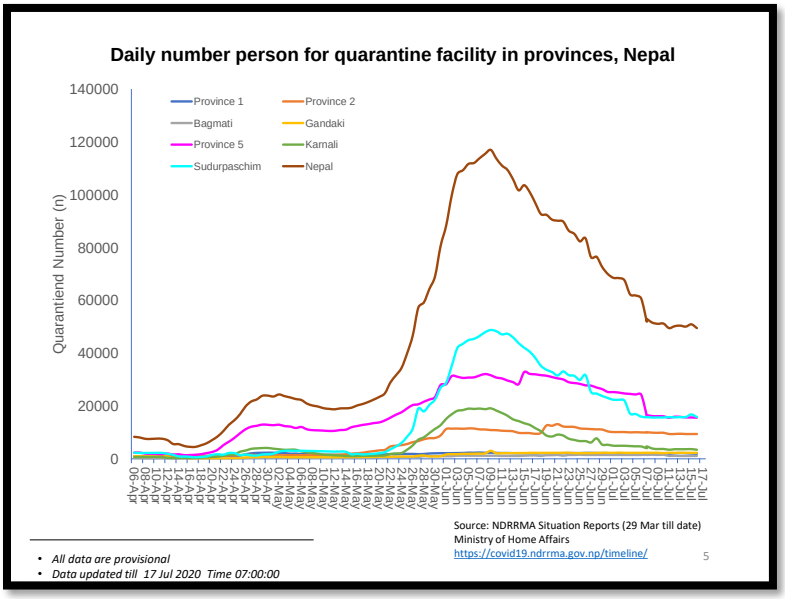


Figure 13: Persons in quarantine facilities (as of 17 July 2020)

Overall conclusion

- So far, Nepal has been able to contain COVID-19 transmission to sporadic or clustered cases by effectively quarantining or isolating international returnees.
- Although, we have seen a declining trend since 2 July, we are also seeing a small uptick by 17 July and following days, which should be watched closely.
- Out of those confirmed COVID-19 cases from whom travel history could be elicited, more than 96% had a history of foreign travel.
- Bagmati province has a slightly different distribution of cases both in terms of age and sex distribution and thereby a higher case fatality ratio.
- Contact tracing has been suboptimal with the increasing number of cases and should be pursued aggressively and systematically enabling Palikas to set up a structure of 'boots on the ground'.
- Pending samples should be brought down not more than 50% of installed capacity at end of business on any day through redistribution of samples, increasing lab turnover rate or installing more capacity or combination of all three.