Contents

Epidemiological update on COVID-19 situation in Nepal -- based on epidemiological update on 10 July 2020 07:00 hours

Top line summary

This detailed epidemiological update is based on 16529 cases (35 deaths) of COVID-19 confirmed through RT-PCR. Core epidemiological variables for a few confirmed cases are under process currently. So far, more than 250,000 samples have been tested for COVID-19 through polymerase chain reaction (PCR).

Transmission pattern

We note a declining trend in daily incident cases which might indicate a real decline. However, before such a conclusion is drawn, the programme must exclude any backlog of samples in the labs.

We have added detailed observation at the end of this note outlining the risks of complacency in surveillance and testing at this stage.

Surveillance sensitivity and testing intensity should be increased at this time so that early signals of a rebound of cases are identified as soon as they occur.

So far, the programme has enjoyed the advantage of having an easily identifiable risk indicator through returnee status of an individual to guide its testing approach. A heightened and more sensitive and 'smarter' surveillance system based on identifying mild or transient symptoms and signs is therefore of crucial importance now.

A surveillance focal point should be designated formally in every palika, district and province to coordinate the surveillance response. All clinical care givers (and community) in the formal and informal sectors should be sensitized about signs/symptoms of COVID-19 disease and alerted to report to the designated surveillance focal point.

Locking down small areas (like municipalities or even districts) fully or partially, will have the highest impact if such interventions are coupled with responsive and smart surveillance for cases and contact tracing and follow-up.

Quarantine and isolation of returning persons must continue as per Government policies with the same intensity as before, Age sex distribution should be monitored by province and by week to identify variations in disease distribution patterns.

Lab data systems must be up to date with a lab turnaround time of not more than 48 hours and backlog of pending samples at the labs minimized.

Deaths

Thirty persons (five female) who tested positive for COVID-19 have died. Of these, 21 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 12 million cases and more than 550,000 deaths globally (https://www.worldometers.info/coronavirus/#countries accessed on 12 July 2020) has become an unprecedented public health challenge for all countries.
- As of 10 July 2020 (07:00 hours), Nepal has reported 16,532 cases confirmed through PCR and 35 deaths. This report is based on 16,529 cases for which core data is available.
- 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	739	0	Cluster of cases	14 (14)	09-Jul-2020
Province 2	4269	4	Cluster of cases	8 (8)	09-Jul-2020
Bagmati	717	6	Sporadic cases	13 (13)	09-Jul-2020
Gandaki	1234	5	Sporadic cases	11 (11)	09-Jul-2020
Province 5	4020	10	Cluster of cases	12 (12)	09-Jul-2020
Karnali	1644	4	Cluster of cases	10 (10)	09-Jul-2020
Sudurpaschhim	3906	6	Cluster of cases	9 (9)	09-Jul-2020
National Total	**16529**	**35**		**77 (77)**	**09-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 10 Jul 2020 Time 07:00:00*

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

Incidence and trend of cases

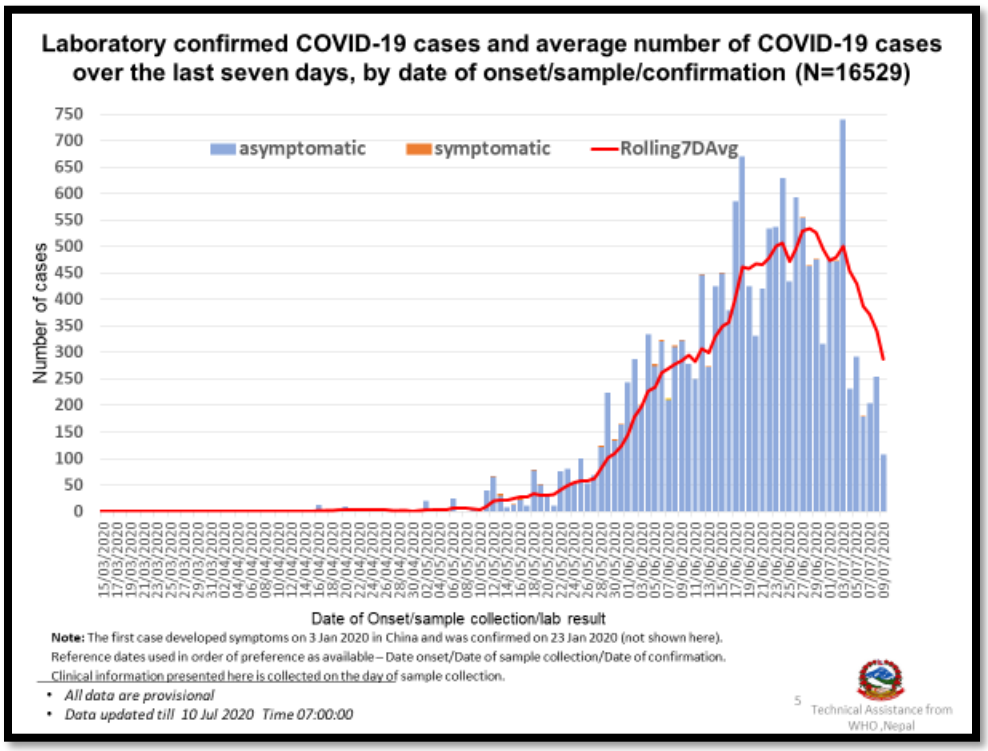

Figure 1: COVID-19 daily incident cases by symptom at presentation and 7-day rolling average of cases

- The national daily incident and cumulative cases with 7-day rolling average trendline and the daily incident cases by province are shown in Figure 1, Figure 2, and Figure 3.
- In last week's update, we had noted a decline in the incidence curve. That trend continues overall, although with the resumption of some repatriation flights, Bagmati province has shown a small spurt in cases.
- This decrease in incident cases and consequent lengthening of doubling time [Figure 4] is a positive development. However, this development should be interpreted with caution keeping all contextual information and epidemic intelligence in mind as outlined in the last section of this note.

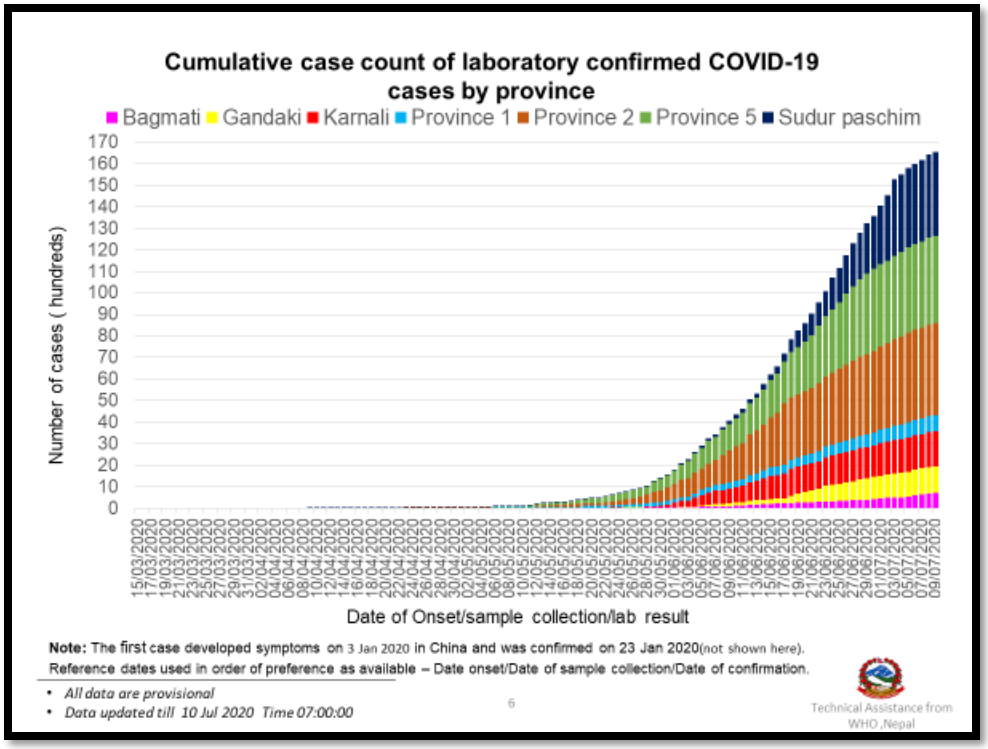

Figure 2: Cumulative incidence of COVID-19 confirmed cases by province

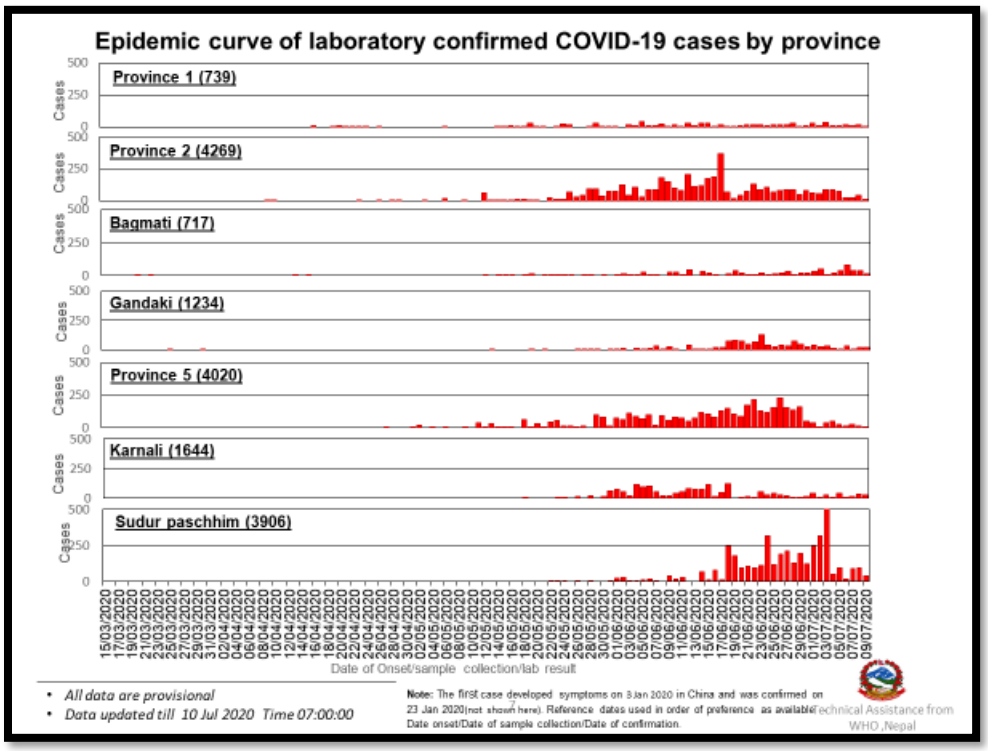

Figure 3: Panel of province wise epi-curves of confirmed COVID-19 cases

Observed doubling time for cases

- We estimated observed doubling time of cumulative cases at national level from 20 March to 10 July 2020. [Figure 4]
    - 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.

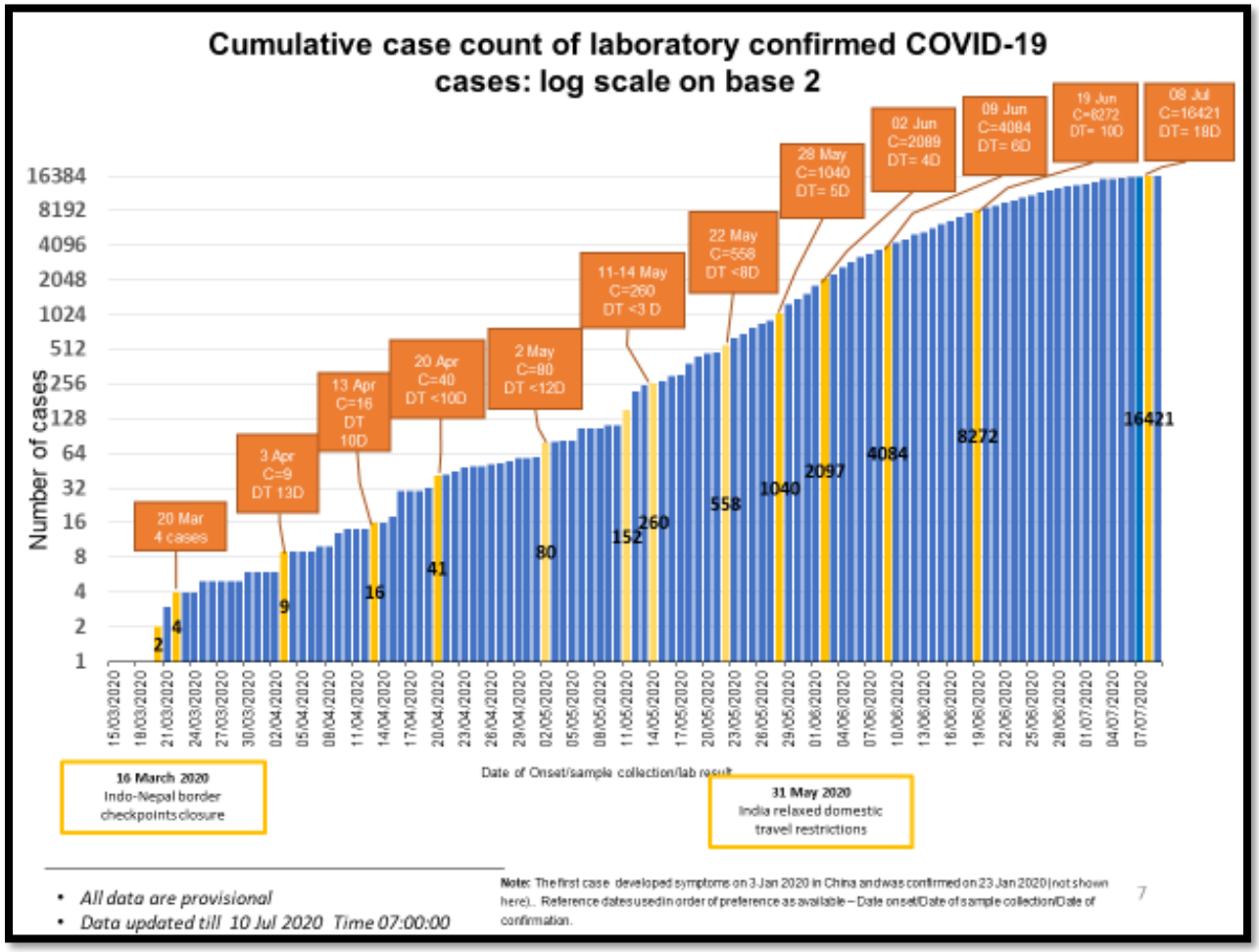

Figure 4: Observed doubling time of cumulative case count 20 March to 2 July 2020

- 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 fully 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.
    - If no municipality within a district had reported any confirmed COVID-19 case in last 14 days, the district is considered temporarily unaffected (no shading).
- 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.

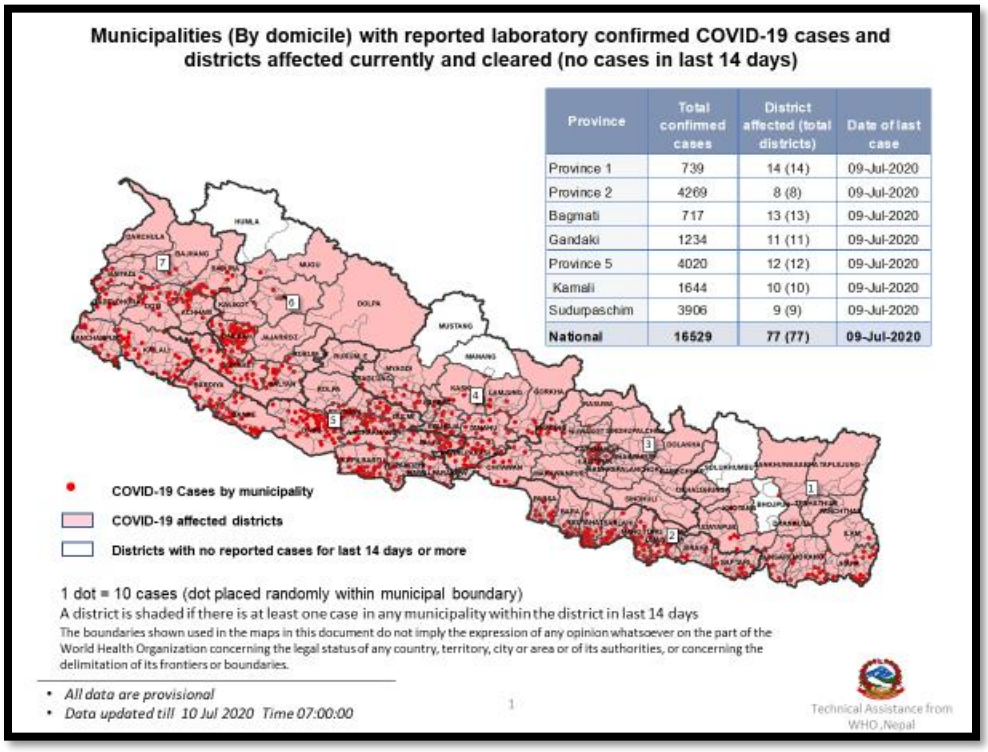

Figure 5: Distribution of cases by place of confirmation or residence and clearance of COVID-19 transmission

- As per data available until 10 July 2020, cumulative incidence rate (attack rate) per 100,000 population is 55.46 at national level and by province it ranged from a low of 11.22 in Bagmati to a high of 134.2 in Sudur Paschim province. [Figure 6]
- Clearly, province-2, province-5 and the western provinces are experiencing a high cumulative incidence.

- Although concerns have been expressed about the state of transmission in Bagmati including environmental isolation of SARS-CoV-2, the incident case data clearly 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 0.98 (district of Province-1) to as high as 397.71 in districts of Sudur Pashchim.

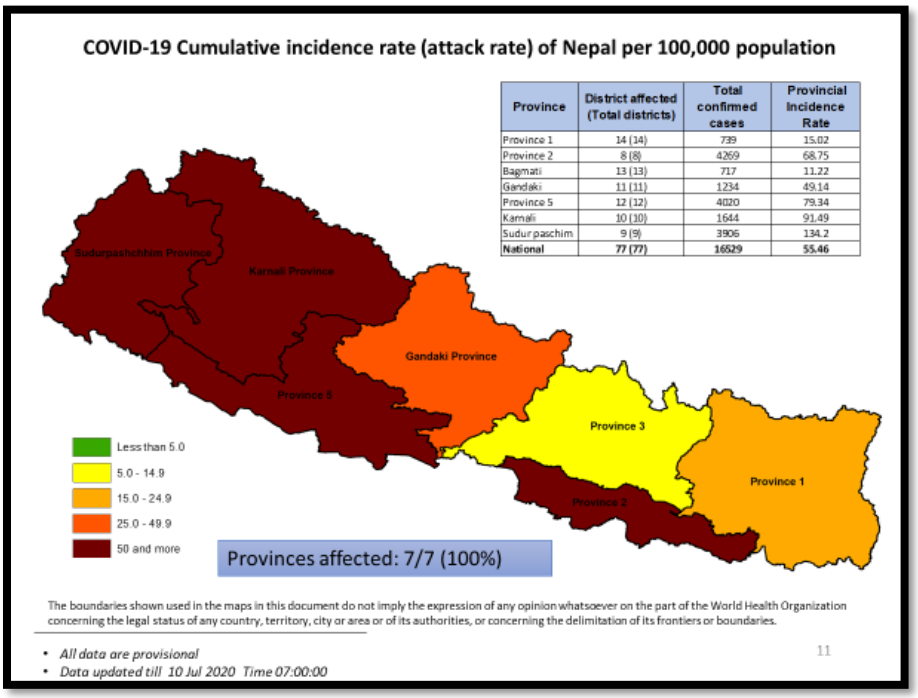

Figure 6: Cumulative incidence rate (attack rate) per 100,000 population by province

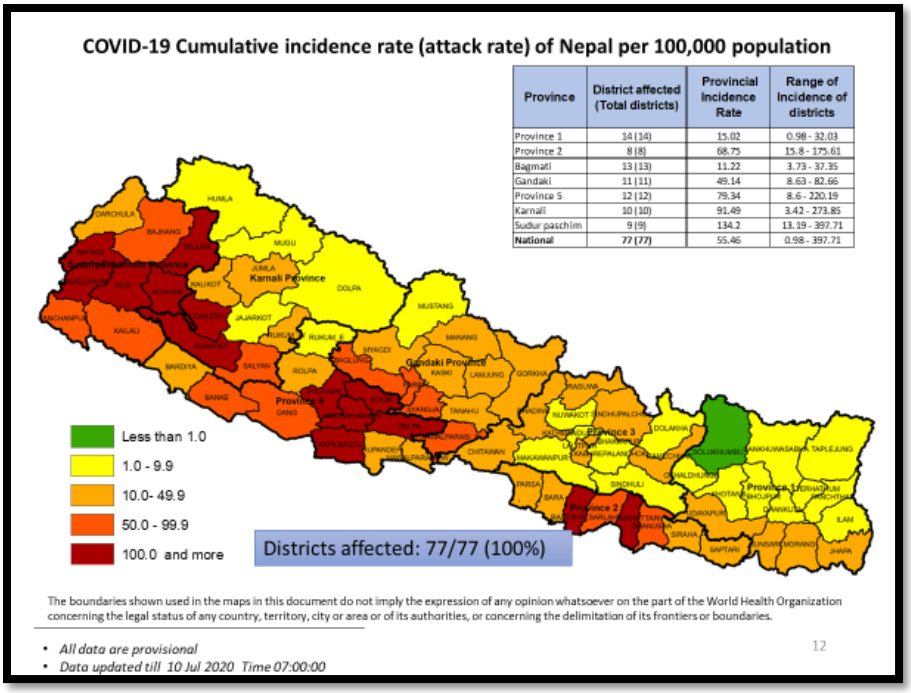

Figure 7: Cumulative incidence rate (attack rate) per 100,000 population by district

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 8 and Table 3]
- 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 a useful surrogate indicator of population groups most affected by COVID-19 infection.
- There are important differences in proportion of males between the provinces as well as within the same province over time
- A more equal distribution between male and female would tend to indicate transmission in general population in the province rather than predominantly among migrant workers. Between provinces, Bagmati has the lowest proportion of males at 68%, while in the remaining provinces it varied between 77% and 90%.

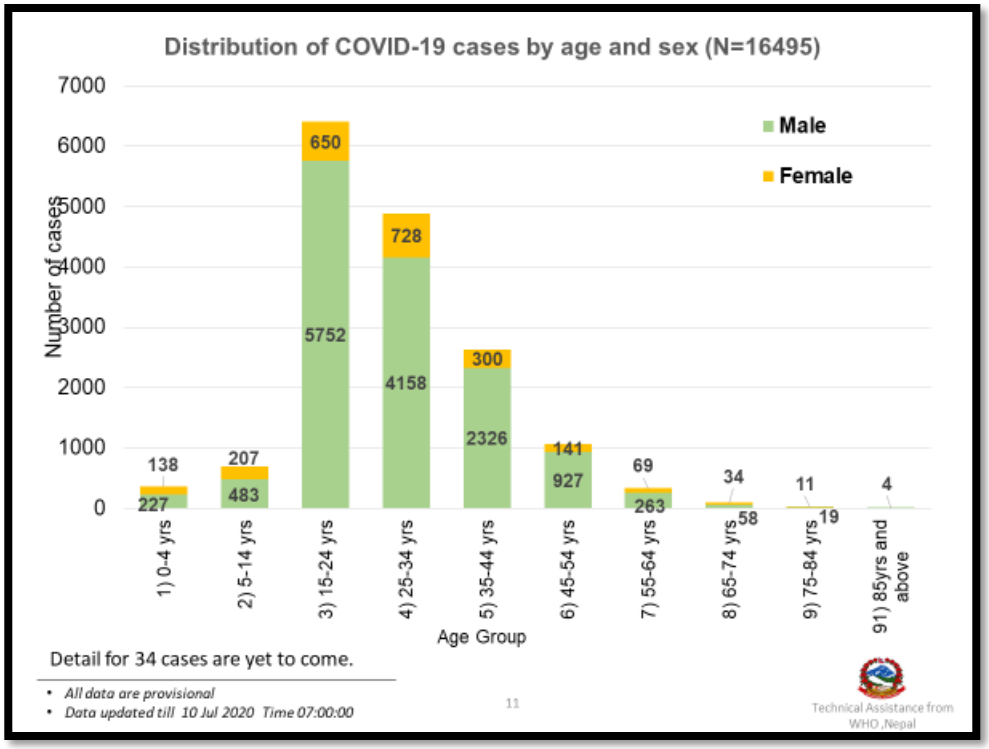

Figure 8: Age-sex distribution of confirmed COVID-19 cases

Table 2: Proportion (%) of males by province and by week (N = 14,044)

Distribution of COVID-19 cases by age and sex by province (N=16529)

Percentage of male among total confirmed cases: 86% (14245/16529)

Percentage of male in 15-54 year among confirmed male cases: 92% (13163/14245)

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	22	44	26	15	1	2	0	0	0	123
	Male	3	21	233	189	111	40	17	2	0	0	0	616
	Total	7	30	255	233	137	55	18	4	0	0	0	739
Province 2	Female	20	39	59	86	35	18	7	2	1	0	3	270
	Male	32	192	1753	1089	650	203	49	14	3	0	14	3999
	Total	52	231	1812	1175	685	221	56	16	4	0	17	4269
Bagmati	Female	2	4	55	104	34	15	7	5	4	0	1	231
	Male	4	11	120	179	86	53	18	8	5	2	0	486
	Total	6	15	175	283	120	68	25	13	9	2	1	717
Gandaki	Female	1	10	36	53	29	13	6	6	0	0	1	155
	Male	12	20	382	332	202	98	23	6	2	1	1	1079
	Total	13	30	418	385	231	111	29	12	2	1	2	1234
Province 5	Female	31	51	137	126	64	25	17	5	4	0	0	460
	Male	31	65	1451	1048	630	256	61	10	5	0	3	3560
	Total	62	116	1588	1174	694	281	78	15	9	0	3	4020
Karnali	Female	7	9	53	63	13	10	6	2	1	0	0	164
	Male	25	32	650	427	216	101	27	1	1	0	0	1480
	Total	32	41	703	490	229	111	33	3	2	0	0	1644
Sudurpaschim	Female	73	85	288	252	99	45	25	12	1	0	1	881
	Male	120	142	1163	894	431	176	68	17	3	1	10	3025
	Total	193	227	1451	1146	530	221	93	29	4	1	11	3906
National	Female	138	207	650	728	300	141	69	34	11	0	6	2284
	Male	227	483	5752	4158	2326	927	263	58	19	4	28	14245
	Total	365	690	6402	4886	2626	1068	332	92	30	4	34	16529

- *All data are provisional*
- *Data updated till 10 Jul 2020 Time 07:00:00*

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Table 3: Age-sex distribution of confirmed COVID-19 cases by province

Travel history status

- We tried to obtain history of international travel (from India as well as other countries) in 4-6 weeks prior to confirmation from 16,527 cases and could obtain it from the records and direct inquiry from 9,920 (60%) of cases.
- Overall 58% of cases had a history of international travel and it could not be obtained from 40% of cases. Form those in whom such history or information could be obtained, 96% (9533/9920) had history of international travel.
- History of international travel varied between provinces with a high of 84% in Province-1 and a low of 35% (60% unknown travel history) in Bagmati. Of note, in Sudur Paschim province, 44% had history of international travel with 56% as unknown travel history.

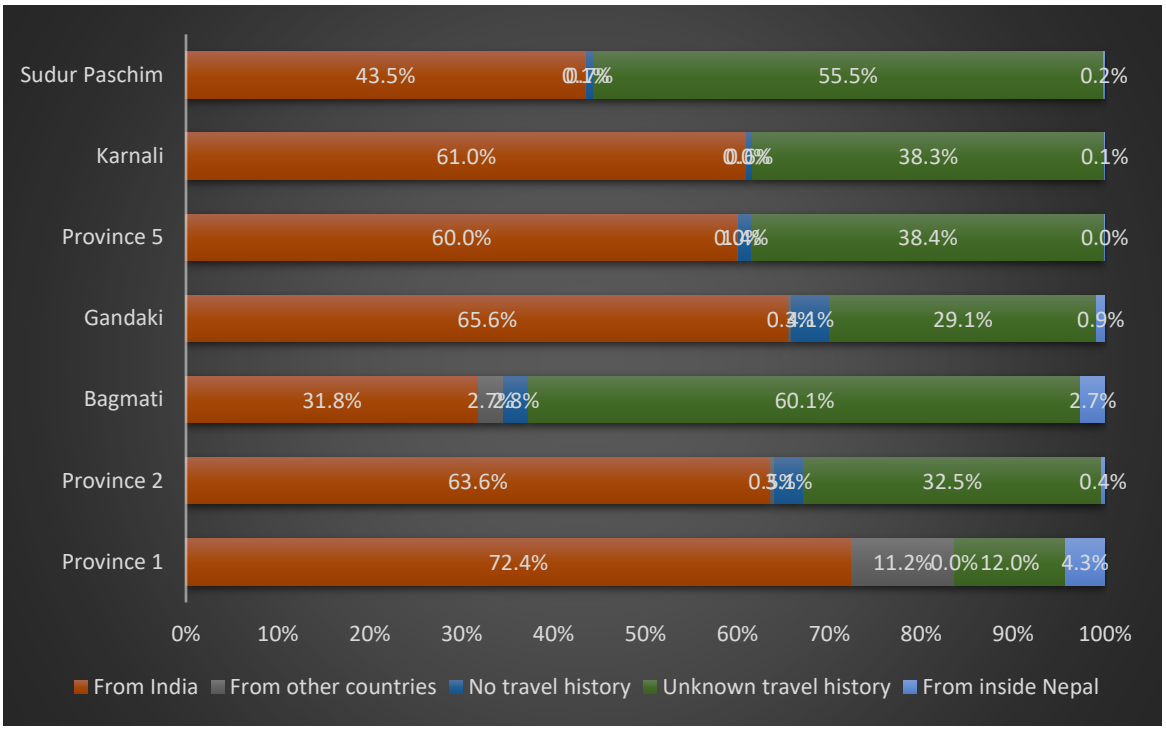


Figure 9: History (%) of travel among confirmed cases

Province	Confirmed cases	Travel from India	From other countries	No travel history	Unknown travel history	From inside Nepal
Province 1	739	72.4%	11.2%	0.0%	12.0%	4.3%
Province 2	4,269	63.6%	0.5%	3.1%	32.5%	0.4%
Bagmati	716	31.8%	2.7%	2.8%	60.1%	2.7%
Gandaki	1,233	65.6%	0.3%	4.1%	29.1%	0.9%
Province 5	4,020	60.0%	0.0%	1.4%	38.4%	0.0%
Karnali	1,644	61.0%	0.0%	0.6%	38.3%	0.1%
Sudur Paschim	3,906	43.5%	0.1%	0.7%	55.5%	0.2%
Grand Total	**16,527**	**56.9%**	**0.8%**	**1.8%**	**40.0%**	**0.5%**

Table 4: History of travel (international and domestic) among confirmed cases

Laboratory results (based on data available at EDCD)

We analysed laboratory data shared by EDCD (as of 7 July 2020) for 219,868 PCR swabs collected [Table 5]. This data set may not be complete for all provinces and labs.

- Overall, 3% of specimens are pending testing at the laboratories with 4% pending in Province-2 and Sudur Paschim and 6% in Province-5.
- Excluding Bagmati, the proportion of positives is 7% nationally with a high of 10% and 11% in Prv-5 and Prv-2.
- The data are incomplete as they do not account for all tests conducted and there may be some time lag in the system between time data is available at respective labs and the time that it is reported to EDCD. If the same proportions hold when all the results are compiled, then that would be a sharp improvement from last week when 7% specimens were pending. However, this 3% pending translates to more than 5,000 specimens pending testing in the labs and the results may well impact the current declining trend in incident cases.
- We also looked at population based cumulative swabbing rates for PCR based on this data. [Table 6]
    - Nationally it is more than 7300 per million persons, with a high of 17789 in Karnali and a low of 3256 in Bagmati.
- 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. A high number of samples pending lab testing may mislead program managers in identifying patterns of transmission in real time.

Province	*PCR Swabs Collected*	*PCR tests Positive*	*PCR tests Negative*	*Result pending at Lab*	*Percent Pending*	*Per cent Positive*
	A	*B*	*C*	*D=A-(B+C)*	*E=D/A%*	*F=B/(B+C)%*
Province-1	*29,109*	*704*	*28,405*	*-*	*0%*	*2%*
Province-2	*47,100*	*3,785*	*41,534*	*1,781*	*4%*	*8%*
Bagmati	*20,796*	*718*	*20,078*	*-*	*0%*	*3%*
Gandaki	*18,660*	*1,149*	*17,203*	*308*	*2%*	*6%*
Province-5	*45,850*	*3,964*	*39,323*	*2,563*	*6%*	*9%*
Karnali	*31,963*	*1,722*	*30,241*	*-*	*0%*	*5%*
Sudur Paschim	*26,390*	*3,753*	*21,665*	*972*	*4%*	*15%*
Total	***219,868***	***15,795***	***198,449***	***5,624***	***3%***	***7%***

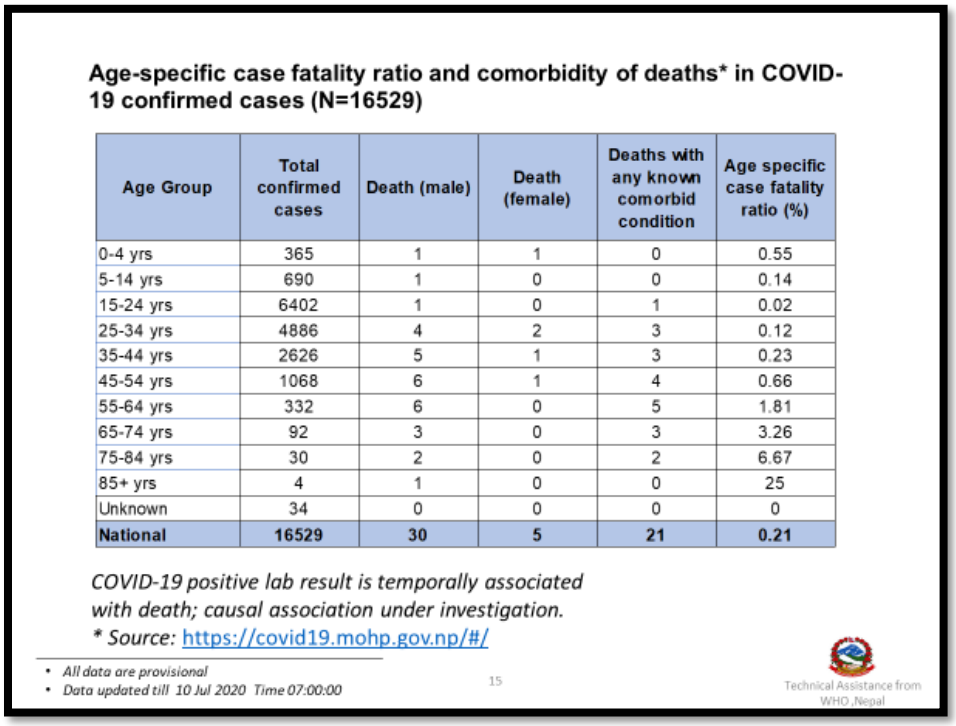
Table 5: Laboratory results, percent positivity and percent pending by province (data from EDCD as on 7 July 2020)

Province / Country	PCR Swabs Collected	Population	Cumulative PCR swab rate per million persons
(1) Province 1	29,109	4,921,498	5,915
(2) Province 2	47,100	6,209,507	7,585
(3) Bagmati	20,796	6,387,632	3,256
(4) Gandaki	18,660	2,511,136	7,431
(5) Province 5	45,850	5,066,640	9,049
(6) Karnali	31,963	1,796,822	17,789
(7) Sudur Paschim	26,390	2,910,497	9,067
(8) Nepal	**219,868**	**29,803,732**	7,377

Table 6: Cumulative PCR swabbing rate per million persons

Deaths and case fatality ratio (CFR)

- Thirty persons (five female) who tested positive for COVID-19 have died. Of these, 21 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 10]



Age-specific case fatality ratio and comorbidity of deaths* in COVID-19 confirmed cases (N=16529)

Age Group	Total confirmed cases	Death (male)	Death (female)	Deaths with any known comorbid condition	Age specific case fatality ratio (%)
0-4 yrs	365	1	1	0	0.55
5-14 yrs	690	1	0	0	0.14
15-24 yrs	6402	1	0	1	0.02
25-34 yrs	4886	4	2	3	0.12
35-44 yrs	2626	5	1	3	0.23
45-54 yrs	1068	6	1	4	0.66
55-64 yrs	332	6	0	5	1.81
65-74 yrs	92	3	0	3	3.26
75-84 yrs	30	2	0	2	6.67
85+ yrs	4	1	0	0	25
Unknown	34	0	0	0	0
National	**16529**	**30**	**5**	**21**	**0.21**

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 10 Jul 2020 Time 07:00:00*

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Figure 10: 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.

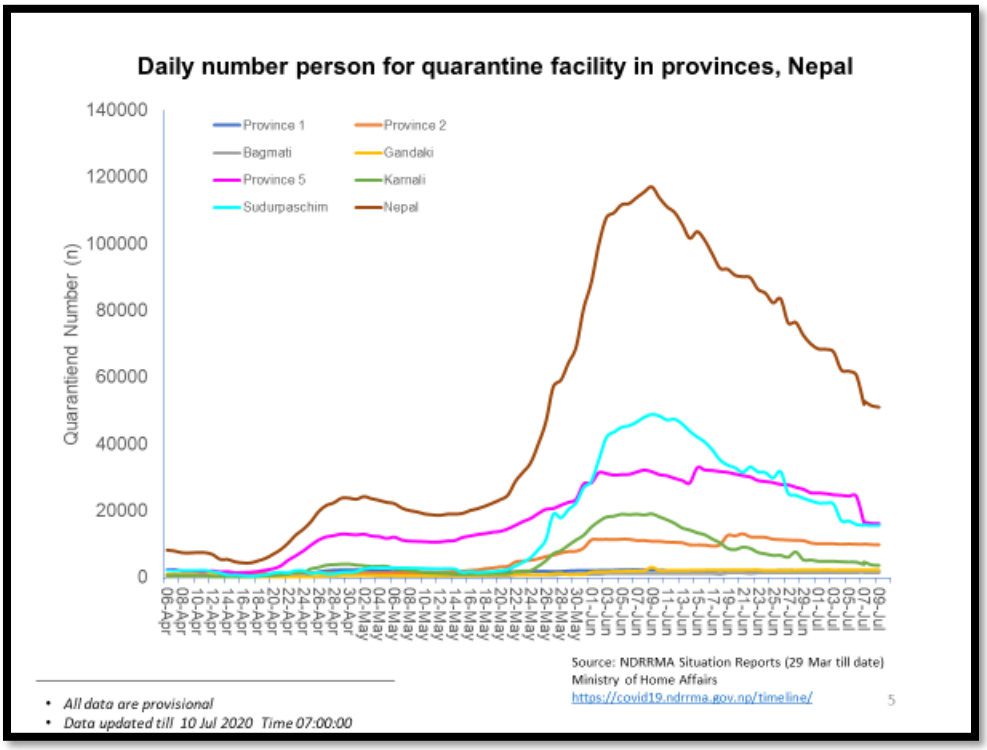

Figure 11: Persons in quarantine facilities

Overall conclusion

- We have observed a decline in rolling 7-day average of incident cases from 2 July 2020. While this could indicate a real decrease in incident cases, partly because f declining trend of returnees, we should be cautious in our interpretation of this decline keeping the following factors in mind:
    - We should closely observe if this declining trend continues for at least twice the maximum incubation periods (28 days) and be certain that it is not a daily variation alone.
    - The surveillance programme should collate and triangulate data and information from several sources, especially pending samples in the labs and lab quality assurance, as well as numbers returning to the country and occupancy of quarantine and isolation centres.
- We had pointed out earlier that the prime driver of exponentially increasing growth observed in the past few weeks in Nepal was likely the large number of retuning migrant workers across the southern border.
- If the currently observed decline is not an artefact of pending samples at the lab, then it seems that aggressive testing of incoming migrants coupled with quarantining and isolating them has been able to limit the transmission to the returning migrant workers and their close contacts.

- The surveillance programme must now be doubly alert to the fact that the successive waves of returning migrant workers will have spread some infection in the community. So far, the programme had enjoyed the advantage of having an easily identifiable risk indicator of returnee status to guide its testing approach. As the number of returnees over land decline [Figure 11] this surrogate indicator of risk identification and case capture will decrease in utility, despite some smaller numbers returning over air.
- A heightened and more sensitive and 'smarter' surveillance system is therefore of crucial importance. **Surveillance should continue with the same or greater intensity of testing but with sharper mechanisms of identifying persons manifesting early or transient and mild symptoms or signs of COVID-19 disease and following up on their close contacts irrespective of their returnee status. This will be critical in identifying chains of transmission in the community early enough and to try to control them.**
- **A surveillance focal point should be designated formally in every palika, district and province to coordinate the surveillance response.** All clinical care givers (and community) in the formal and informal sectors should be sensitized about signs/symptoms of COVID-19 disease and alerted to report to the designated surveillance focal point.
- Locking down small areas (like municipalities or even districts) fully or partially, will have the highest impact if **such interventions are coupled with responsive and smart surveillance for cases and contact tracing and follow-up.**
- Quarantine and isolation of returning persons must continue as per Government policies with the same intensity as before, surveillance should be **more** sensitive now that case numbers are declining so that a rebound is detected at the first signal. Age sex distribution should be monitored by province and by week to identify variations in disease distribution patterns.
- Lab data systems must be up to date with a lab turnaround time of not more than 48 hours and level of pending samples at end of the day not allowed to exceed half the daily testing capacity of any lab so that they can reasonably be tested by the next working day. In case one lab is overloaded with samples, central level monitoring should ensure that the samples are redistributed to other labs. There is a wide disparity in lab load against installed capacity in different labs.
- Informal communication from EDCD suggests that community testing with PCR has revealed very low positivity (<0.5%) in Kathmandu valley. If correct, this would indicate that indeed there is very low transmission in the community, inside the valley. However, before drawing firm conclusions, all such data should be fully and rapidly analysed with geographic tagging.