



International Civil Aviation Organization

**WORKING PAPER**

A39-WP/436  
TE/194  
16/9/16  
**(Information paper)**  
**English only**

## ASSEMBLY — 39TH SESSION

### TECHNICAL COMMISSION

#### Agenda Item 36: Aviation safety and air navigation implementation support

#### AIRCRAFT ACCIDENTS IN NEPAL: FACTS, CHALLENGES AND INITIATIVES

(Presented by Nepal)

#### EXECUTIVE SUMMARY

Nepal's high mountainous topography poses serious challenges to the safe aircraft operations. Majority of aircraft accidents in Nepal occurred while operating in airfield located in high altitude terrain. Most of these accidents are confined to the small turbo-prop aircrafts of less than 19 passenger seat capacity and helicopters. This paper provides the factual information about the aircraft accidents, associated challenges and Nepal's initiatives to reduce these accidents.

<i>Strategic Objectives:</i>	This working paper relates to the Safety Strategic Objective.
<i>Financial implications:</i>	N/A
<i>References:</i>	Doc 10004, <i>2014-2016 Global Aviation Safety Plan</i> ICAO Safety Report, 2016 Aviation Safety Report, Nepal 2016

## 1. INTRODUCTION

1.1 Nepal constitutes a unique geographical feature coupled with adverse ever-changing weather phenomenon associated with the Himalayas and altitudinal variations. Many airfields in Nepal are lying either in the narrow valley of high mountain or on the top of hill with elevation ranging from 8000 feet to 10000 feet AMSL. Small turbo-prop aircrafts operate in these airfields flying through uneven terrain and narrow gorges. So, flying to these vulnerable airfields in such a hostile environment is very challenging in itself.

## 2. AIRCRAFT OPERATIONS IN NEPAL

2.1 Aircraft operations in Nepal can be categorized basically in four category as follows:

S.No.	Type of Operations		Number
1.	Schedule	International	3
		Domestic	7*
2.	Non-schedule		3
3.	Helicopter		8
4.	Recreational		3

**Fig. 1 Aircraft Operations in Nepal**

*\*Nepal Airlines and Buddha Air operate both international and domestic flight.*

2.2 Nepal Airlines, a State-owned carrier operates international sector with B757 and A320 aircraft. Himalaya Airlines, a joint venture with Tibet Airlines of China, is a new international airline operating its service with A320 aircraft. Buddha Air, a major contributor in domestic front, is operating its regional flights to Varanasi, India.

2.3 Domestic airlines operate with ATR-72/42, Jet Stream, CRJ 200, MA-60 and B1900C/D fleet in trunk-route connected domestic airports situated in the plain areas. Whereas, small turbo-prop aircraft like DHC-6 300/400, DO-228, Y-12E, LET 410 operate mostly to STOL airfields situated in mountainous high altitude areas ranging from 8,000 to 10,000 feet AMSL.

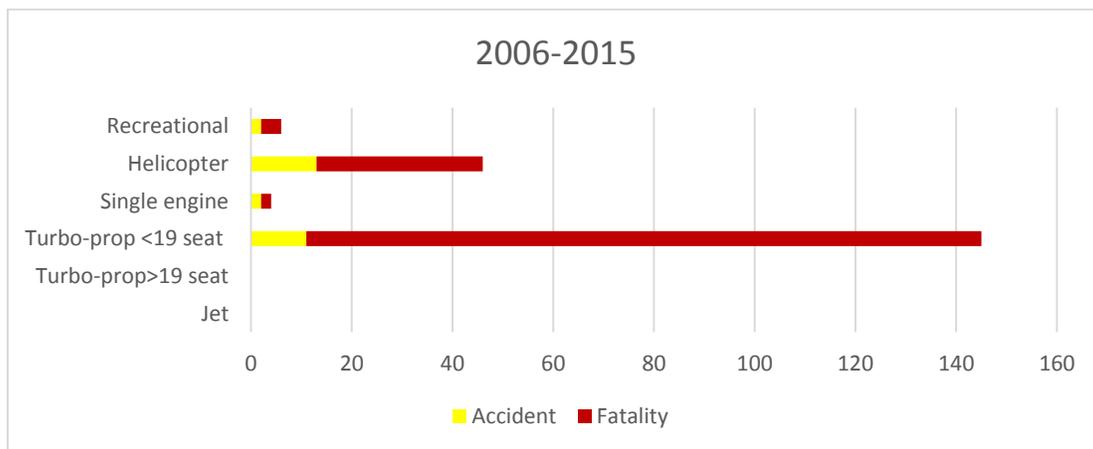
2.4 Small single-engine aeroplanes like C-208B and PAC 750XL operate passenger and cargo charter services mostly in remote airfield of mountainous area. These aeroplanes are not authorized to operate scheduled flights.

2.5 Helicopters are mostly engaged in high altitude rescue operations and logistic support to facilitate trekkers and expedition. Majority of helicopters operating in Nepal are AS350, BELL 206, AS332, MI 8MTV AMT, etc.

2.6 Recreational aviation is based in Pokhara valley, the most exotic tourist destination of Nepal. Small piston engine ultralight aircraft are operating to support recreational aviation.

### 3. ACCIDENT OF NEPALESE REGISTERED AIRCRAFT (2006-2015)

3.1 Accidents records of Nepalese registered aircraft for the period of last 10 years from 2006 to 2015 is as follows:



**Fig. 2 Accidents by aircraft category**

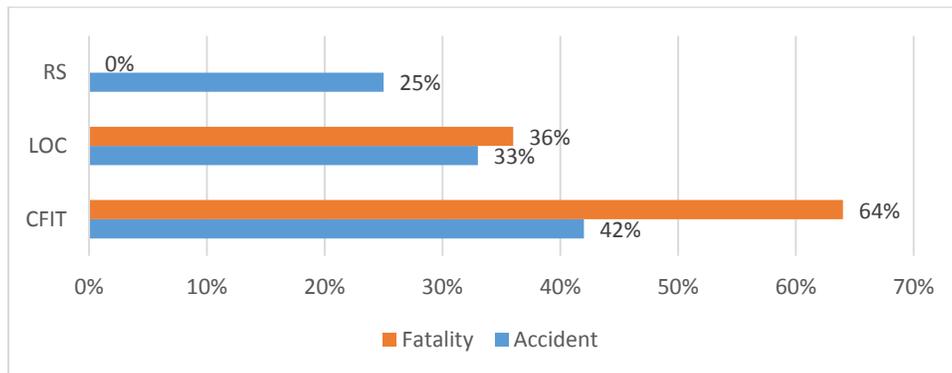
3.2 Accident data represented in the table above reveals that majority of these accidents are associated with small Turbo-prop aircrafts of passenger capacity  $\leq 19$  seats. Among the 11 accidents of turbo-prop aeroplane relating to the schedule operations, 6 were fatal accident with 134 fatalities. Such aircraft usually operates in the STOL airfields located in hilly and mountainous region under VFR condition.

3.3 Past data indicates that the fatal accidents have not occurred in international sector and domestic trunk routes connecting the major controlled aerodromes. Mostly, large turbo-prop aircrafts operate in these sectors and they are capable to fly under IFR.

3.4 Among the 13 accidents relating to the helicopter operations, 6 accidents were fatal and 7 non-fatal. A total of 13 persons died in these 7 accidents during the period of ten years. There were sudden increase in the number of accidents and fatality relating to helicopters operations during 2015. This can be attributed to the tremendous increase in the number of helicopter movement during 2015 engaged in post-earthquake relief movements.

3.5 In Nepal, CFIT still remains the major contributor to the total aircraft accident and fatality relating to the multi-engine turbo-prop aircraft having seating capacity at or below 19 seat. Among the 12 accidents recorded during the period of past 10 years and including the accident of the year 2016 till August, 5 accidents were related to CFIT with 100 fatalities. In contrast to the world accident trend, the accidents related to Runway Safety was the lowest one, i.e. 3 accidents with zero fatality. Whereas LOC related accidents were second largest after CFIT with a total of 4 accidents and 57 fatalities.

3.6 Human error associated with pilot judgment is behind the cause of most accidents in Nepal. Accident reports have revealed that had pilot diverted back instead of giving continuity his flight despite of encountering bad weather, many such accidents could have averted.



**Fig. 3 High-risk Category Accident and Fatality**

#### 4. CHALLENGES OF AIRCRAFT OPERATIONS IN NEPAL

4.1 Nepal's high mountainous topography poses a serious challenges to the safe aircraft operations. Majority of these accidents occurred while operating in airfield located in high altitude terrain during bad weather conditions.

4.2 There are no aids to navigation in airfields located in mountainous region. Installation of traditional navigation aids are not feasible due to the high mountains and hills. So it is up to the pilot to use his best experience and knowledge to fly in these areas.

4.3 People living in the remote, hilly and high altitude regions have no other options than air transport. Airfields in these regions can be appropriately termed as ALTIPORTS rather than STOLPORTS. Air strips in these airfields constitute high gradient and permits one way approach. Go around execution in many such fields are either prohibited or strictly discouraged

4.4 Aircraft has to rely on destination airports and other airports for the en route weather information. In the flight sector of many remote areas, there are no alternatives to receive en route weather. Individual way of anticipation and prediction about the weather is the norm for all pilots to adhere to, which might mislead them inadvertently.

4.5 In VFR flight operations, pilots have to rely on their innate capacity to assess the weather phenomenon. While flying to and from a remote STOL airfield located in the mountainous region, pilots have to fly along the narrow gorges and passes where in case of any judgment error on their part aggravated by a bad weather encounter en-route, even a narrow escape may be impossible an impossibility.

## 5. SAFETY MEASURES TO REDUCE ACCIDENT

5.1 Operations under VFR in Nepal are unavoidable due to various constraints such as topography, limited air space at most of remote destinations, and non-feasibility of installing relevant Navigational facilities and development of IFR based departures and arrivals procedures. Care has to be taken by pilots while flying visually in bad weather condition. Aircraft accidents over the last 10 years show that these accidents occurred while operating flights under VFR. So, Nepal has introduced strict regulation against the violation of VFR.

5.2 CRM is an effective tool for flight crew personnel to assure safe and efficient operation, error reduction, stress avoidance and increasing efficiency by using all available resources. Nepal has made it mandatory for all domestic air operators to ensure their flight crews of CRM and CFIT reduction training.

5.3 Nepal has made mandatory provision of EGPWS for all twin-engine aircrafts engaged in domestic schedule operations as required by Flight Operations Requirements (Aeroplane).

5.4 Nepal has introduced some stringent requirements in flight crew qualification to operate flight in high altitude airfields. Airfields have been categorized in terms of their elevation and pilot clearance requirements have been introduced accordingly.

5.5 Majority of recommendations of aircraft accident investigation show that there are certain common factors on these accidents. Nepal has focused to address in deficient areas as identified by accident investigation reports. It has been found that about 71 percent of these recommendations have already been implemented. Non-compliance of the remaining ones is ascribed to either their non-applicability or irrelevance.

5.6 Due to the nature of operations and the operant conditions of the environment, performance of aircraft needs to be maintained without any deficiencies left behind. Human factors training has been considered as very essential in reducing maintenance-related error in aviation. Nepal has introduced human factor training in aircraft maintenance area.

5.7 Highly localized safety awareness programme such as National Aviation Safety Campaign, Safety management, Monsoon seminars and Wire-strike awareness programme are being regularly organized in collaboration with airline industry and other partners. Such programmes have been fruitful in providing insights on situational awareness in local context of flying.

## 6. CONCLUSION

6.1 Aircraft operations in Nepal has its own peculiarities. People living in remote hilly and mountain regions have no other choice than air transport for travel and supply of essential goods. Small Turbo-prop aeroplanes and helicopters are the lifeline of air transport service in this region. To reduce the rate of accident in this type of operations, Nepal has focused its efforts to strengthen regulation, technology and training, the defences of the aviation safety system. Regulatory body and industry are working in a collaborative approach to reinforce these safety defences. As a result of all these efforts, significant progress has been observed in overall safety performance in Nepalese civil aviation system.