

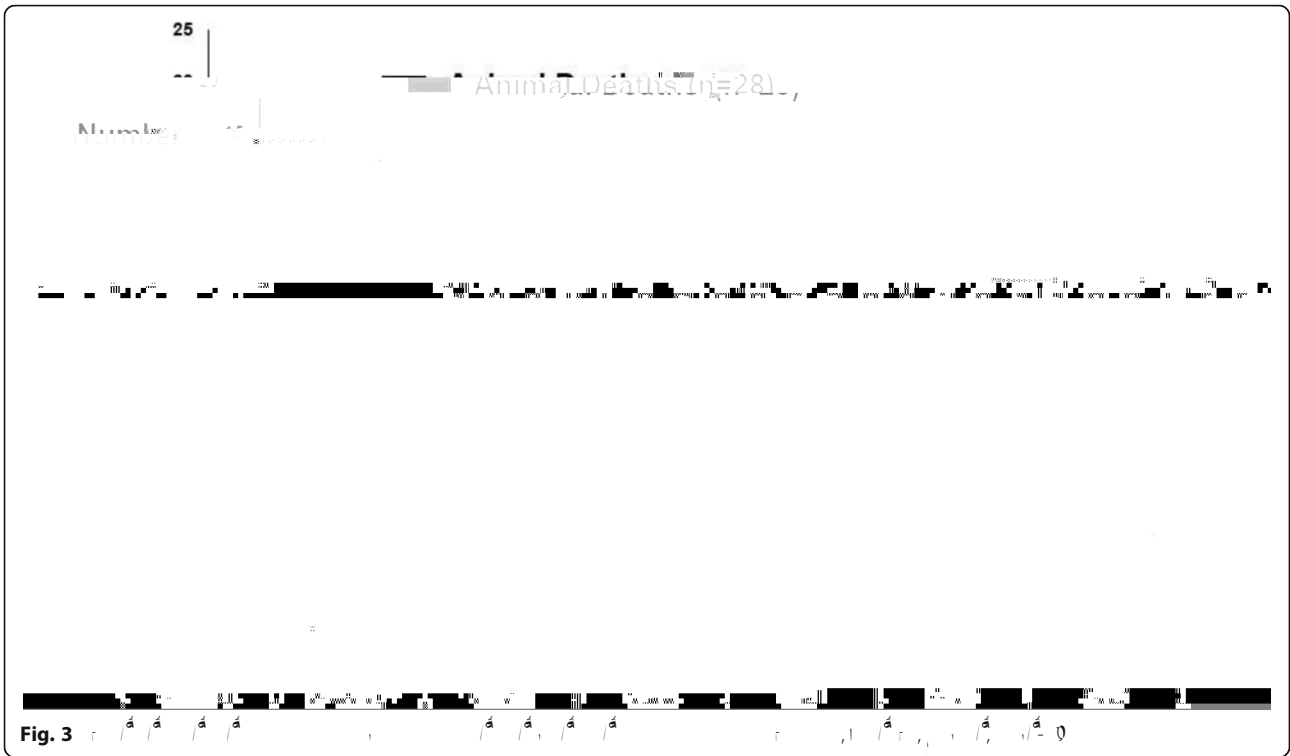


Human anthrax in India is a notifiable disease. It commonly affects communities living near forest areas and outbreaks are predominantly reported from eastern states such as Odisha. Koraput is a tribal district in Odisha and is endemic for animal anthrax with poor vaccination among the livestock reported. Human outbreaks have been reported every year in Koraput since 2002, but limited coordination between the animal and human health sectors have led to incomplete laboratory confirmation and limitations in the detection, control and prevention of these outbreaks. Rapidly detecting and controlling public health emergencies, such as anthrax outbreaks, at their source is an important goal of the World Health Organization's International Health Regulation; meeting the IHR obligations enhances global health security.

(30 US dollars). Among the cases, 89% were males, and the median age was 38 years (range 5–72 years); there were 3 deaths (case fatality rate = 4%). All cases had cutaneous lesions such as eschars; 16% had malaise and 10% fever. No cases reported shortness of breath or bloody diarrhoea.

The onset of the outbreak occurred the 1st week of February 2015, continuing till the 2nd week of July with 2 peaks in the months of June and July respectively. There were no cases reported after the first week of July (Fig. 3).

Among 37 cases and 74 controls, illness was significantly associated with closely handling carcasses of ill cattle such as burying, skinning, or chopping (OR: 342, 95% CI: 40.5–1901.8) and with eating meat of ill cattle (OR:



a 5 km radius of the 20 affected villages were vaccinated by anthrax spore vaccine. No other livestock were vaccinated. The vaccination coverage of livestock before the outbreak was < 1% (1833/305,497) and then 2% (6900/305,497) after the vaccination campaign.

Discussion

We report on a cutaneous anthrax outbreak mostly among males in a tribal community of Koraput district, Odisha. This community has a history of recurrent anthrax outbreaks that occur seasonally, from April to June. Our investigation demonstrated clustering of human cases in areas of animal deaths with human illness strongly associated with eating and handling the carcasses of ill cattle. Low vaccination coverage of livestock and inadequate carcass disposal practice in affected sub-districts likely contributed to the outbreak and to the ongoing risk in the community.

Anthrax continues to be enzootic in under-developed areas of the world lacking adequate preventive measures [3]. Rapid diagnosis, isolation, treatment with antimicrobials and other adjuvant therapies among human anthrax cases and measures against transmission are essential to minimize disease progression and to help control outbreaks quickly and effectively. With 1% prevalence of culture positivity among outbreak household cattle, Koraput district has endemic livestock anthrax and inadequate vaccination coverage; these factors likely contribute to continuous transmission of anthrax in this region [4].

Socio-cultural practices such as slaughtering of sick animals, eating or handling meat from infected animals, and dumping of dead carcasses in the open have contributed to anthrax transmission in outbreaks reported from Africa and Southeast Asian countries [4]. Scavenging carcass meat for consumption is culturally acceptable to some of the local tribes in Koraput district and is

Table 1

	(n)	(n)	%
	00%	%	(. - / .)
	%	%	(0 - .)

associated with anthrax transmission. Low socioeconomic status and poor education of the tribal community combined with poor public health infrastructure creates a synergy of risk factors that are conducive for zoonotic transmission of anthrax to the human population [5]. Increasing the tribal community's awareness about risk factors for illness may help avert future outbreaks. As part of the response to this outbreak, health education camps were organized to sensitize the community on behavioral change for anthrax prevention. All the villagers were educated through simple health messages from the community health workers such as "not to handle the sick animal without protection," "safe disposal of dead animal with disinfection," "not to consume raw meat," "cook it well before eating," etc.

As part of the outbreak investigation, a daily reporting system with active surveillance was established in the vulnerable villages and contact tracing was done. In previous outbreaks, delayed reporting of ill persons and poor community awareness about the illness were important risk factors for continued transmission of infection. Furthermore, unreported livestock deaths and seasonal variation of anthrax transmission in the district may also contribute to the persistence of outbreaks [6].

Strengthening district level laboratory capacity for anthrax is crucial for early identification of an outbreak. Lack of anthrax culture capacity or other diagnostic methods in the district laboratory limits detection of anthrax in animal, human and environmental samples. There is need to strengthen the laboratory surveillance system at the district level both for animal and human

