

Oil Spill in Chennai:

Fact Finding Report on Health Impacts of Oil Spill on Clean-Up Workers, Fisherfolk and Residents in Ennore



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The fact finding team would like to convey its thanks to all the members who participated in the investigation and contributed to the report.

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Introduction

On February 7, 2017, 10 days after the oil spill off Kamarajar Port Ltd, three doctors from Chennai -- who also have a shared interest in public health issues visited Bharathi Nagar (or Bharathiyar Nagar) on Ennore Expressway to interact with people engaged in spill cleanup, fishermen and residents (including the elderly, women and children) in the vicinity. The purpose of the visit was to:

1. Assess the on-ground situation in terms of health impacts of the spill
2. Assess the occupational safety precautions given to the spill cleanup crew and local fishermen involved in the safety.
3. Assess the impacts of the spill on general public health in the region
4. Assess the response of the state government on safeguarding workers and general public from the health impacts of the spill.
5. To make immediate and long term recommendations regarding the management of such disasters.

Background

On 28 January 2017, at about 4 a.m. “*M.T.BW Maple*” (IMO: 9320752), a Liquefied Petroleum Gas (LPG) tanker and “*M.T. Dawn Kanchipuram*” (IMO: 9116917) transporting POL (Petroleum, Oil and Lubricant), collided outside the Harbour of the Kamarajar Port Ltd (KPL) in Ennore, north of Chennai. This collision resulted in the spilling of about 40 tonnes of thick oil into the Bay of Bengal¹, affecting the marine life and a long stretch of shoreline of about 40 km from Chennai towards Mahabalipuram. Weathered oil and oily patches were reported from beaches 40 km south of the point of collision.

There has been and continues to be a lack of accurate and reliable information put out by the authorities on the quantum of the spill and nature of the material spilled. This has essentially hindered clean-up operations and limited our understanding of the health and environmental effects of the spill. According to various newspaper reports it is understood that more than 2000 persons were involved in the cleanup, many of them young volunteers from the city. Several pictures of oil-soaked volunteers and cleanup crew started doing the rounds in the media in the immediate aftermath of the spill. Though there is very little official information on the nature of this spill, **petroleum oil and its derivatives** are known to have toxic chemicals that may cause **temporary to permanent** damage to human health. This team is concerned with the occupational safety and public health fall-outs of the spill clean-up response.

Observations and Findings

The team spoke to more than 50 persons on the morning of 7 February 2017 between 7.30 and 10 am. The respondents were from cleanup crews of the Indian Coast Guard, fishermen,

¹ Lloyd's List, Maritime Intelligence, 7 February 2017

fire and rescue personnel, Corporation of Chennai conservancy workers, residents including the elderly and women of the area and school students.

These are some of observations:

Scene at Bharathiyar Nagar, Ennore Expressway:

While our team could not inspect or interact with workers along the entire stretch of the affected coast, we visited one site at Bharathiyar Nagar on the Ennore Expressway, which was reported to be the epicenter of the disaster. The air in this region had a strong “petroleum” stench to it. There was heavy cargo and transport traffic on the road and the presence of the cleanup crew made the place very crowded. Though there were police personnel deployed, there was no cordoning off of the contaminated site (rocks and the beach). People had unrestricted access to the site. Our team found several oil sludge filled drums on the western side of the



sea wall along the road. Many of the drums were leaking oil on the road.



There were no instructions restricting entry or reminding about precautionary or safety measures to be taken that was provided by the Tamil Nadu Pollution Control Board or any other agency. One of the police personnel informed the team that there were more than 20,000 people on Sunday (5 February) the site. He said that most people who visited the site were curious onlookers who had come to see what an oil spill looks like. According to him

many were carrying their young children too and many climbed on the oil soaked rocks to click selfies with a better view. The police personnel had a tough time managing the crowd. Oily rocks were a perfect stage for many accidents and injuries apart the exposure to the toxic chemicals from the spill itself.

Crew involved in cleanup activity:

The entry point to the sea was just closed by 2 barricades, which was not supervised, thereby leaving the entry unrestricted. On entering into, there was a group of fishermen who had just finished fishing. Upon enquiry they informed that they too participated in the cleanup activity, not by choice but by force. They mentioned that their livelihood depended on the sea and it became necessary for them to get involved in the clean up to speed up the work. They also mentioned that they were given only gloves and were paid Rs.500 every day for the cleanup work.

A few men and a woman of foreign origin were called in, as the coast guards were getting ready for the cleanup. Unlike the other unprotected workers, they wore full-body coveralls, helmets, cotton gloves and boots. They seemed to be receiving instructions on the day's plan.

At least five fire-tenders were deployed in Bharthiyar Nagar and about 140 fire and rescue workers were engaged in the spill cleanup. The personnel were mostly wearing their usual rescue service uniform of fluorescent t-shirts and shorts. Most of them did not even have gloves, masks or boots.

Around 50 police personnel (few women police were also seen) were stationed very close to the disaster site. They reported that they attended duty on rotation. They were all seen in their uniform, none of them provided with PPE. Few corporation sanitary workers (men and women) were working 50 metres away from the site. They were wearing rubber gloves which they had taken from the garbage that they were collecting.

A large number of media persons were present at the site. Several television media persons were wearing oil soaked gloves to dramatise the visuals, not realizing that they were handling toxic waste.

Workers told the team that they had not gone through any medical check-up before the work or during the cleanup activity.

Students were seen walking on the roads on their way to school. The residents in the area were seen carrying on with their routine activity.

Health Effects:

Responding to a quick open-ended survey of our team, the clean-up workers and the coastal inhabitants, reported increased acute toxic symptoms primarily that of ocular (eye irritation) and respiratory symptoms (throat irritation, chest tightness and cough). Almost everyone who was interviewed (fishermen, policemen, fire and rescue workers, conservancy workers, residents, women and children) reported these symptoms from the time that the oil spill had occurred. A few also reported symptoms like headache, nausea and vomiting. Some of the people who were involved in the cleanup activity also reported skin irritation on the exposed parts of the body. Table 1 gives an overview on the possible acute health effects on exposure to chemicals released during an oil spill.

Table 1: Acute toxic effects of the oil spillage

Chemical	Route of exposure	Symptoms
Volatile organic compounds & Polycyclic Aromatic Hydrocarbons	Dermal	Skin irritation Redness of skin (Erythema) Dermatitis
Volatile organic compounds (Benzene, Xylene and Ethyl Benzene)	Through air	Ocular - redness, soreness, watering and itching
Volatile organic compounds (Benzene, Xylene and Ethyl Benzene)	Inhalation	Respiratory – cough, throat irritation, shortness of breath
VOCs (benzene, toluene)	Inhalation	Neurological: nausea, vomiting, headache, irritability, confusion, weakness of extremities

Source :Assessing the effects of the Gulf of Mexico on Oil spill on Human Health : A summary of the June 2010 Workshop.

The workers involved in the clean up had also reported symptoms relating to the physical hazards like heat and ergonomic hazards. Owing to the strenuous work schedule, heavy physical workload and long duration of work some of them reported musculoskeletal problems like fatigue and lower back ache.

Since the workers are working in a hot weather, a few reported symptoms related to heat stress like giddiness and muscle cramps, which continued even after going home. The volunteers who had shown up for the clean up activity are at increased risk, as most of them would not have been acclimatized to work in such hot weather and noxious environment. A police official reported that two spectators had a fall on the oil-covered rocks.

Personal Protective Equipment:

The use of appropriate Personal Protective Equipment (PPE) during oil spill cleanup can protect workers from acute toxic effects. In Ennore, we found that rubber gloves and boots were the only PPE that was used by the workers. Since some workers wore short sleeves or shorts, the gloves and boots were not sufficient to prevent exposure to skin. Some workers also wore surgical masks and a few others wore handkerchiefs around their nose and mouth.

No worker was found to be wearing certified respirator masks suitable for such situations. The PPE was given only to a few workers among those engaged directly in the oil clearing process. Other workers like sweepers who were clearing the waste generated in the process

of clean up activity were also equally exposed to hazardous chemicals. But they were not provided with any PPE.

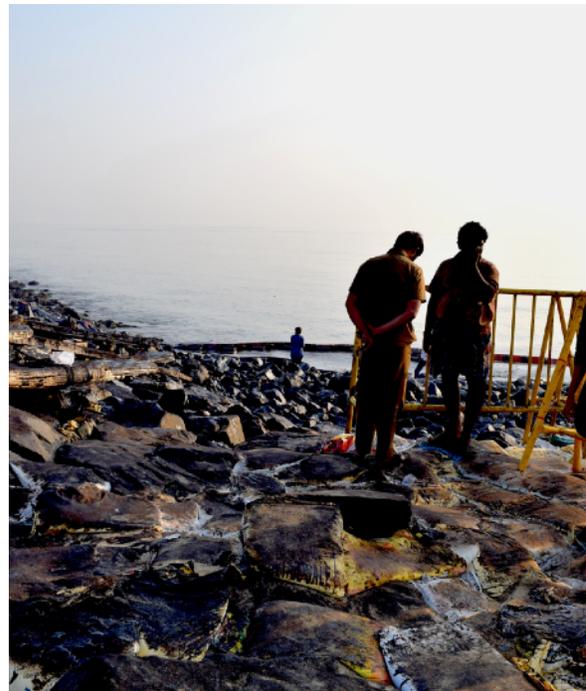


Only a small section of the workers (from the Coast Guard) were provided with full coveralls. In general, most of the workers got involved in the cleanup work with whatever clothes they were wearing. Lack of PPE to workers would result in them carrying the hazardous chemicals from the cleanup site to their

own homes and potentially exposing their family members to the toxins as well.

No separate washing area was visible where workers could wash and clean up after work. People with oil-smearred limbs were seen eating food and drinking water thereby increasing the risk of exposure.

Contaminated boots and gloves (covered in oil) were found strewn around up to 200 meters from the shore. Used boots and gloves ought to be securely contained and disposed of as hazardous wastes as per the Hazardous Wastes Rules.



Mixing of Hazardous Waste with Municipal Waste:

It was noticed that the oil-contaminated waste was being collected along with the municipal waste and was being transported to city's municipal waste landfills rather being treated separately as Hazardous Wastes.

Medical Facilities on the Site:

Amma Canteen's kitchen, approximately 200 meters from the disaster site, had been converted into a makeshift medical unit since 4th February after pressure on the Department of Public Health to respond to the situation. There were notice boards put up from across from the spill site directing workers to proceed to the local Amma Canteen for any medical help they required. Our team visited the canteen for more details. Our team was informed that the medical officers normally arrived by 9.30 am. There was a healthcare

worker present who talked about the cases they received. He reported that many people have been complaining about cough and running nose and throat irritation; but cases like skin allergy were very few. While the health worker present was of the opinion that most



people who came did not have problems relating to the oil spill, according to the workers we interviewed, there were a number of minor symptoms,

Since the camps were only set up a week after the spill, there is no estimate of the effects on people who were involved in the early stages of the clean up when exposure to the volatile chemicals was maximum, and when the clean-up was even less coordinated and unprotected than it was during our visit.

Assessment of the long-term impacts on health of clean-up personnel is difficult in the absence of the levels of contaminants that the workers were exposed to, and without a long-term health study of the workers. This may now well be difficult given that there is no list of workers who had been part of the clean-up. This too is a deviation from best practice.

Our interaction with the health workers revealed that they had very poor understanding of the effects likely to arise out of exposure to chemicals, and other stresses during an oil spill clean-up. This seriously undermines their capacity to provide advice and health care to those exposed to the spill.



The healthworkers' observation that many people are flooding the medical center with "un-related" symptoms could also be correct. The area has no health facilities. So any health camp will automatically attract a large number of walk-ins eager to access medical facilities. One health worker informed that many school children had fallen ill in the last few days mostly with complaints of nausea and vomiting.



Upon inspection of medical boxes kept in the canteen, we found boxes stacked with paracetamol, NSAIDS like Ibuprofen, ointments like Zinc Oxide for skin rashes, liquid paraffin, antibiotic eye drops, deriphylline tablet, cough syrup and few antibiotics like amoxicillin for treatment. Overall we were of the opinion that all medical condition of the residents after the

oil spill needs to be investigated and monitored in the long-term.

Sanitation among workers:

During our visit we found precarious health and sanitation arrangements made for the cleanup crew. While there were two mobile toilets at the site, we noticed that the cleanup workers were washing their oily hands and legs at several drinking water sources of Bharthiyar Nagar. There are no separate area for cleanup crew to wash the oil off their bodies. Use of public water sources for cleanup crew's personal hygiene could lead to further contamination of the drinking water sources in the region.

Interaction with the Fishermen - Psychological Effects:

The team interviewed with several fishermen in the region. Many of them reported skin itching and lesions as a result of contact with the oily sludge. Fishing nets worth lakhs of rupees were reportedly destroyed because of contact with oil. While the dangers of oil spill to their health remain, the fishermen strongly conveyed that it was not the health effects

but the psychosocial and economic effects of the spill that burdened them. The fishermen complained that there has been a drastic reduction in the fish catch due to the spill. As a result, their livelihood has been severely impacted. Their livelihood was further affected as people were shying away from

purchasing fish due to concerns that the fish was toxic. It is clear that the fishermen in the region are under tremendous stress.



Interaction with the Conservancy Workers:

Conservancy workers (both men and women) from Corporation of Chennai have been deployed to assist in the cleanup. While we did not see any of them engaged in cleaning the spill in the ocean or coast, they were involved in cleaning the roads, collecting the oily sludge-filled drums and clearing the oil-stained gloves and boots strewn around. These workers were not provided with any coveralls or any other PPE. Some had gloves



that they said had been picked up from the discarded gloves.

Interaction with the Fire & Rescue Personnel:

At least five fire-tenders were deployed in Bharthiyar Nagar and about 140 fire and rescue workers are engaged in the spill clean up. The personnel were mostly wearing their usual rescue service uniform of fluorescent t-shirts and shorts. Most of them did not even have gloves or boots. Some officers said that coveralls were too expensive and were hence not provided to workers. The training officer of fire and rescue services added that they are primarily trained in fire rescue, flood rescue and rescuing people from drowning in the wells and that they did not have any formal training regarding the oil spill disaster. They informed us that there were no standard protocols and that they were deployed as there was a shortage of manpower.



The fire personnel engaged in cleaning the oil spill without protective gear were also unaware of the health effects of the spill. One officer admitted that few of his colleagues fell ill on the first day itself and they were given leave. He also said that workers complained of excess fatigue and joint pain in the recent days as they had been continuously working for the past ten days.

The food provided – heat-inducing tamarind rice – to the cleanup crew only aggravated an already bad situation, adding to the heat and environmental stress and contributing to digestive disorders.

Interaction with Police Officers:



Several platoons of police personnel were deployed in the area to maintain law and order and avert untoward incidents. Police personnel informed us of a few incidents where curious onlookers slipped on the oily rocks and injured themselves. None of the police persons were provided with specialised masks or respirators. Most of them complained of watering of eyes, throat irritation and cough. Many of them were seen to be under excessive stress controlling the crowd, media and volunteers entering the

clean up site. They also said that the public had converted the disaster site into a picnic spot.

Interaction with School Officials:

Sagaya Matha Matric Higher Secondary School with a capacity of more than 900 students is located opposite to the oil spill site. The school administration reported a higher than normal incidence of eye irritation and throat irritation among the students as well as the teachers in the first two days of the incident. They admitted that they did not expect this spill to become such a massive incident. Though they did not see a significant increase in the school absenteeism after the incident, they did mention that some students were sent back home as they reported complaints of nausea, vomiting and pain in abdomen. There were no instructions given by the district administration on safety or precautions to be taken at the school level. The school repeatedly sought instructions from the officials but there was no response.



Children are more vulnerable to exposure to hazardous chemicals emitted during oil spills. Children cannot be treated as “little adults” for various reasons – they breathe at the ground level and are therefore exposed to heavier toxic chemicals, and they breathe faster and inhale more air in proportion to their body size.

Mental Health:

It was particularly noticed that the coastal residents especially the fishermen were already in stress. If it is left unattended, they are all at risk of developing depression, anxiety and suicidal tendencies. This can also increase the consumption of alcohol, drug abuse and domestic violence. Stress can also exacerbate certain chronic diseases like asthma, diabetes, hypertension and coronary artery diseases. Hence it becomes necessary to immediately assess the mental health status as the disaster has already caused a change in way of life, occupation and income of the fisher folks.

Long term effects of oil spill:

The most commonly occurring chemicals of the VOCs include Benzene, toluene and Xylene (BTX). BTX are carcinogenic in human beings. Benzene is known to cause leukemia in humans. USEPA has classified benzene as Group A – human carcinogen. It is also associated with non-carcinogenic effects like blood disorders, anemia, defects of bone marrow, damage to immune system and also a reproductive toxicant. WHO has estimated a risk of 4 in 1 million to develop leukemia on exposure to benzene to a concentration of $1\mu\text{g}/\text{m}^3$. Toluene – on exposure to high doses of toluene can cause kidney and liver damage, anemia and

depression in central nervous system. Xylene on severe exposure can lead to visual blurring, tremors, heart beat irregularities, paralysis.

Polycyclic aromatic hydrocarbons are of concern because of their persistence and tendency to bio accumulate in the environment. Pyrene is considered as one of the most potent carcinogens known. Exposure to Polycyclic aromatic hydrocarbons is associated with skin, lung, bladder and gastrointestinal cancers, geno-toxicity, cataract, damage to liver and kidney. Biomarker for PAH exposure include measuring of 1- hydroxypyrene, a metabolite of pyrene in urine samples. Evidences suggest that exposure to oil to be associated with geno-toxicity, persistent abnormalities in lung function and inflammatory changes in the airway. Hence it becomes necessary to be cautious and look for such occurrences in the future.



Recommendations to the Government:

Listed below are some of the immediate and long-term recommendations to the government to protect the health of the cleanup workers, residents and general public and to ensure that it has a robust health response team for future environmental/ chemical disaster.

Regarding Information and Public Safety:

1. The entry point to the disaster area may be restricted to the workers, thereby avoiding unnecessary exposure to the residents and general public to the chemical as well as the physical hazard.
2. All workers, volunteers and local residents should be warned and educated about hazards associated with response activities. Health advisories for residents, cleanup crew and fishermen need to put up by Health Departments and widely publicized.
3. Adequate and full and transparent information regarding the toxics released needs to be proactively shared to all concerned through pamphlets, TV and radio messaging and general announcements.
4. Special information and warning to vulnerable populations such as schools, hospitals and other public institutions in the locality should be made available

Regarding the Safety of the Cleanup Workers

1. All workers and volunteers should be educated about hazards associated with response activities. These evaluations can provide baseline information.
2. Only trained workers should be deployed to respond to chemical disasters.
3. Adequate medical care and first aid should be readily available for the workers.
4. High quality and adequate Personal Protective equipment such as protective overalls, rubber or leather gloves, boots, protective eye gear, NIOSH approved respirators, etc. should be provided to everyone who is involved in the clean up activity.
5. Adequate water supply with proper washing area, food and sanitation facilities should be provided to people who carry out the cleaning process.
6. Adequate facilities to be provided to the clean up workers for them to dispose their soiled clothes so that they do not carry the contamination to their residences.
7. The cleanup workers should be continuously monitored in the long-term for the occurrence of new onset of symptoms and the long-term effects of the hazardous chemicals.

Regarding the Health and Safety of the Residents:

1. Monitoring of health effects of the oil spill on the residents in the long-term to understand the actual burden in order to make the necessary interventions in the future. In addition system for long-term medical follow up should be put in place.
2. Special emphasis should be given to monitoring the mental health among the resident.
3. The social and economic aspects of the disaster have to be attended immediately. Compensations for loss of livelihood to fishermen should be given. In addition, long term working relationship should be ensured with the community and their organizations. Mental health status of the community should be monitored continuously.
4. The children exposed in the region should be continuously monitored for cognitive and developmental status.

For the Health Department and State Pollution Control Board:

1. The health care workers should be trained adequately to identify the symptoms, diagnose and treat at an early stage on the health effects of the oil spill.
2. The level of the pollutants in water, air and soil arising from this crude oil spill (like Volatile organic compounds, Polycyclic aromatic hydrocarbons, heavy metals) should be monitored continuously. Central Pollution Control Board has classified VOCs, PAH and heavy metals in air as hazardous air pollutants and also spelled out methods of measuring these pollutants in air. State and Central Pollution control board should be involved in monitoring these pollutants level in air, water and soil of Ennore on a long-term basis.
3. Scientific mechanisms to dispose the waste generated in the clean up activity should be identified and implemented immediately.
4. A makeshift medical center in Amma Canteen shows how these canteens have become the center for community support during distress. It will be good if specialized health and community centers are developed in all disaster prone regions for more robust intervention and crisis response.
5. The Government should make a time-bound robust assessment of the scale of the spill, adequacy of the response and its impact on ecology and health of the people and present the data to plan future prevention and response strategies.