JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH

The Center for Refugee and Disaster Response &
The Center for Public Health and Human Rights

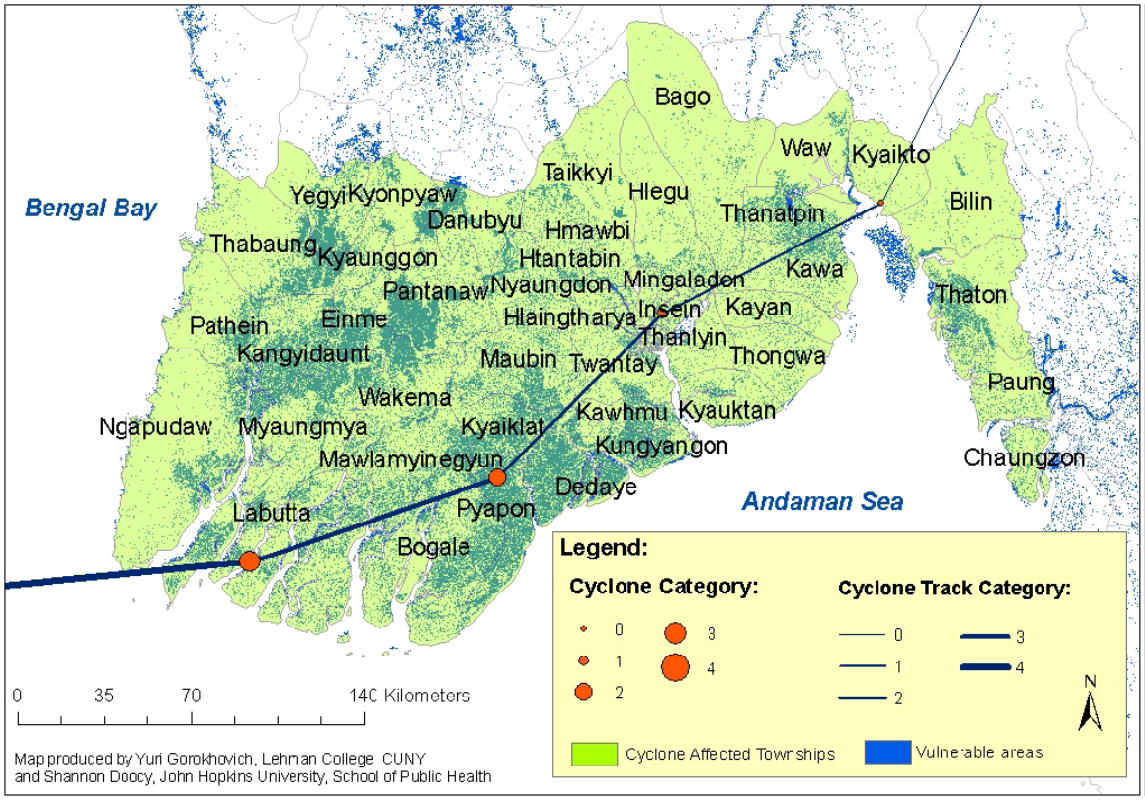
Cyclone Nargis: 3.2 Million Burmese Affected, Limited Humanitarian Assistance Poses Health Threat as Conditions Worsen

On May 2, 2008, Cyclone Nargis, a category 4 storm of enormous force brought high winds, twelve-foot storm surges, and heavy rains destroyed much of the fragile infrastructure of the Irrawaddy Delta region of Burma. The ruling Burmese military regime has reported upwards of 29,000 lives lost in the storm itself, over 42,000 people still missing, and as many as 1.5 million left displaced. Available accounts of survivors and the limited number of international observers in the region suggest that the initial losses of life were likely substantially greater. The UN estimates that some 220,000 missing and 63,000-101,000 dead, though these figures are anticipated to rise. While some 200,000 people may have been reached with some assistance thus far, the vast majority of survivors, more than a week after the cyclone, remain without sufficient food, water, shelter, medication for the sick or means of escape from flooded regions. The Secretary General of the United Nations, Ban ki Moon, has expressed "deep concern" and "immense frustration" with the unacceptably slow response to the crisis by the government Myanmar. The next wave of dying is set to take hold as thirst, starvation, untreated injuries, and infectious diseases pose an increasing threat to population health.

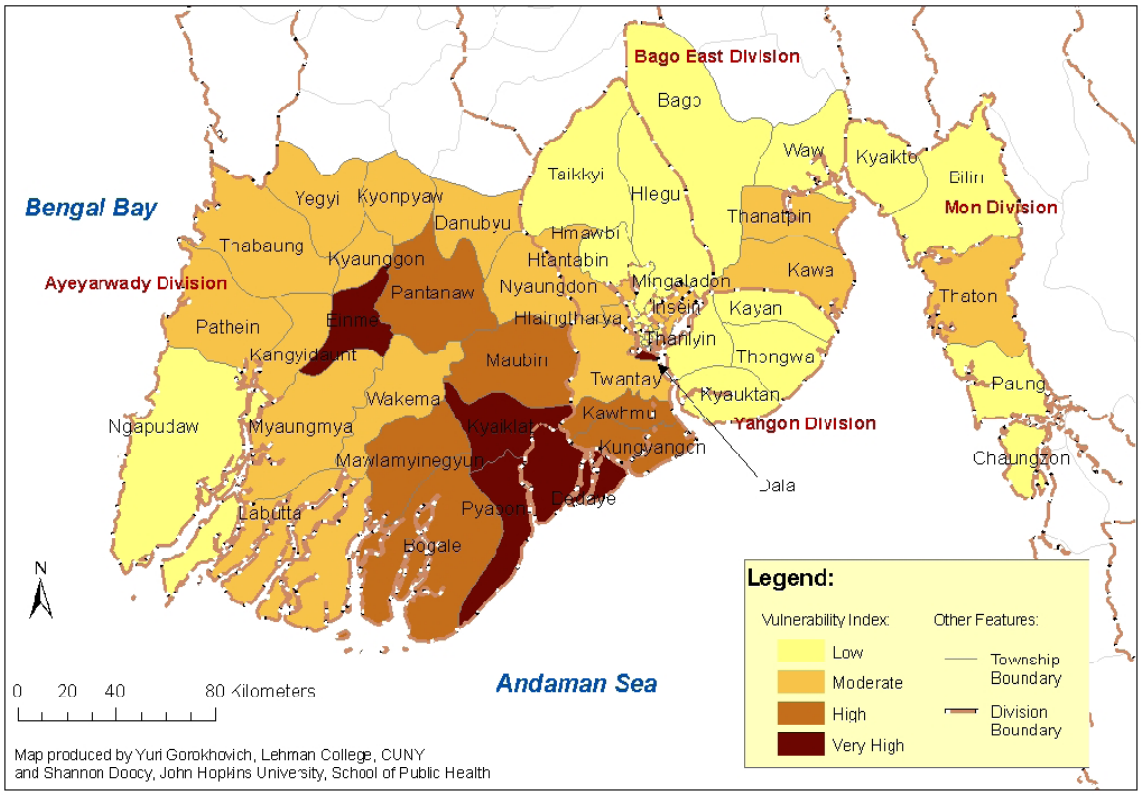
Populations and Areas at Risk

Regions and populations vulnerable to Cyclone Nargis were estimated using Geographic Information Systems (GIS) based models that were subsequently overlaid with spatially distributed population data. Geographic vulnerability models were based on storm path, estimated storm surge derived from the cyclone data, and elevation. Models included all townships within 250km of the hurricane path, and yielded an affected area of more than 10,000 square kilometers. Spatially distributed population data for at risk areas from the Global Rural Urban Mapping Project (GRUMP) at CIESIN, Columbia University was overlaid with GIS-based vulnerability models and aggregated to estimate the affected population. Vulnerability was approximated by a score that reflects proportion of land area and population at risk.

Overall, an estimated 3.2 million people were affected by Cyclone Nargis, the majority of which were in Ayeyarwady (1.8 million) and Yangon (1.1 million) administrative divisions; at least 100,000 people in both the Bago East and Mon Divisions were also affected. Overall, 20% of the population in the four divisions was affected by Cyclone Nargis, with Ayeyarwady Division being hardest hit, with an estimated 36% of the population affected. The townships with the highest vulnerability scores are illustrated in the map, however, it is important to note this is a relative measure based on proportion of land area affected. The greatest impact is anticipated in the areas where the storm first made landfall, notably the townships of Labutta and Bogale where over 200,000 people are thought to have been affected.



Map 1: Cyclone Nargis Path and Affected Areas



Map 2: Cyclone Nargis Vulnerability Estimates by Township

Immediate Health Concerns

Major health threats for cyclone survivors in the immediate phases of storm recovery include water borne diseases such as typhoid, which has already been reported from some areas in the Delta, and potential outbreaks of dysentery, cholera and *E. Coli*. Measles outbreaks in children, which are common in settings of mass displacement, are also a possible threat. Measles is known to have a high case fatality rate among malnourished children—UNICEF estimates that 1/3 of Burma's children under age 5 were malnourished before Cyclone Nargis—and measles vaccination rates for the affected areas are well below thresholds required to prevent an epidemic. Vector borne diseases are also an important health concern. Mosquito borne diseases, particularly malaria and dengue fever, were both prevalent in Burma before the storm, and their risk is now compounded by huge numbers of people sleeping outside and surrounded by water; more than 80% of malaria cases in Burma are *P. falciparum*, the most deadly form of the disease. Food borne diseases, from eating poor quality, old, or spoiled food, are also a potential health risk which is compounded by the lack of cooking fuel and equipment among much of the affected population. Lastly, two diseases endemic in Burma and spread by rodents, plague and leptospirosis, also must be considered as potential health risks. Plague is a particular concern since rodents who have survived the storm will also seek the same dry ground where people will gather, and rodents, fleas and displaced populations historically have lead to epidemics of plague.

Disease outbreaks have not occurred following the majority of tropical cyclones in the past several decades, primarily because of timely humanitarian response which incorporates immediate prevention strategies including provision of adequate water and sanitation, and vaccination campaigns. The underlying population health status of the Burmese population and environmental factors place the population at increased risk of disease. In the aftermath of Cyclone Nargis, where humanitarian assistance is delayed and woefully inadequate in scale, the risk of disease outbreaks is especially high.

Human Rights Considerations

International guidelines on human rights and natural disasters cite the right of all affected populations to evacuation and other life saving measures, to protection against negative impacts of natural hazards, and to access to adequate food, water, shelter, sanitation, and health services. The primary duty and responsibility to provide such protection and assistance lies with national authorities, but where the capacity and/or willingness of national authorities is insufficient to provide these basic protections, the international community has a humanitarian imperative to respond. In the case of Cyclone Nargis, the international community has responded with multiple offers of humanitarian assistance and human expertise. The military regime of General Than Shwe has, however, rebuffed many of these offers—more than a week after the storm, the junta continues to restrict visas, limit international observers, and insist upon relying solely on its own response— an effort which, by all accounts, is markedly inadequate.

What do the existing human rights conventions say about the responsibility to protect those in need? The most relevant convention is arguably the 1976 International Covenant on Economic, Social and Cultural Rights. Burma is not a signatory to this covenant, so is not bound to it in international law. But many of her neighbors and allies, including China, India, and Thailand, are signatory states. This convention includes Article 12, the most articulated statement we have on the right to health care

access. The covenant posits that signatory States *"…recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health."* Steps to be taken to realize this right include: the improvement of all aspects of environmental and industrial hygiene; the prevention, treatment and control of epidemic, endemic, occupational and other diseases; and the creation of conditions which would assure access to medical services for all and medical attention in the event of sickness. Burma has ratified the Convention on the Rights of the Child (in 1991), which mandates that no child be denied health services. So it is under statutory obligation to at least not inhibit health access to the children who have survived the cyclone and are now in need of relief and treatment. Until Cyclone Nargis, the marked lack of healthcare access in Burma and the regime's poor record of responses to HIV, TB, and malaria epidemics received little international attention. This has changed abruptly as the international community has witnessed the intransigence of the regime, and its priorities of secrecy and control over human health and well-being.

Do Burmese citizens deserve protection from epidemic diseases, such as the diarrheal disease outbreaks underway already in the flooded Delta? Yes. Do they have the right to basic necessities such as food, water, shelter, and medical attention which the international community and humanitarian assistance teams now waiting for visas in Burma's neighbor States can help provide? Again, they clearly do. The limitations placed on these forms of humanitarian assistance on the part of the Burmese junta arguably amount to human rights violations. Rights violations against civilians have been a reality of life under the generals for many years in Burma, where a UN Special Rapportuer for Human Rights was appointed under Kofi Annan—but rarely has the world seen this regime's actions and attitudes so openly exposed.

Community-based Partners

But once again, the people of Burma are rising to a huge task. Relief efforts are underway by many private groups and citizens organizations. Our local partner on the ground, Emergency Assistance Team—Burma, has eight relief teams with five persons each working in Rangoon and in the Delta. These teams are trained in rapid assessment and response. They are adapting to needs on ground: doing water purification, food distribution (food and other essentials needs to be purchased—since survivors are being charged for relief), clothing, cremations, house repairs, and emergency medicine. They are trying their best to fulfill responsibility to protect, even if their Government is failing to do so. Donations to support JHU and their partners in cyclone relief can be made at the Center for Refugee and Disaster Response's *Make a Gift* page, at https://jhweb.dev.jhu.edu/eforms/form.do?formId=4173

Acknowledgements

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Cyclone Nargis: Affected Population and Land Area Estimates by Township

	Vulnerable Population	Total Population	Percent Population Affected	Vulnerable Land Area (sq km)	Total Land Area (sq km)	Percent Land Area Affected	Vulnerability Index Score
All Affected Areas	3,205,575	16,162,056	19.8	10,253	46,881	21.9	434
Ayeyarwady Division							
Bogale	132,285	382,979	34.5	829.2	2,457.8	33.7	1,165
Danubyu	25,809	102,128	25.3	214.4	822.2	26.1	659
Dedaye	151,611	211,165	71.8	617.7	896.1	68.9	4,950
Einme	104,846	191,460	54.8	372.4	681.8	54.6	2,991
Kangyidaunt	65,815	97,153	67.7	73.4	691.0	10.6	720
Kyaiklat	101,827	198,043	51.4	434.7	842.4	51.6	2,653
Kyaunggon	41,867	174,492	24.0	96.7	409.3	23.6	567
Kyonpyaw	35,831	187,318	19.1	146.4	761.8	19.2	368
Labutta	81,743	301,292	27.1	586.4	2,287.4	25.6	696
Maubin	167,899	531,398	31.6	441.7	1,397.9	31.6	998
Mawlamyinegyun	91,217	301,487	30.3	366.2	1,120.6	32.7	989
Myaungmya	109,136	363,419	30.0	542.6	1792.9	30.3	909
Ngapudaw	185	375	49.3	2.87	3455.8	0.1	4
Nyaungdon	57,759	241,037	24.0	227.8	927.9	24.6	588
Pantanaw	90,324	244,348	37.0	582.6	1556.9	37.4	1,383
Pathein	220,539	536,114	41.1	305.1	1471.5	20.7	853
Pyapon	138,114	215,483	64.1	558.6	836.2	66.8	4,282
Thabaung	35,467	173,967	20.4	361.5	1772.2	20.4	416
Wakema	99,605	330,216	30.2	346.7	1140.0	30.4	917
Yegyi	78,608	329,927	23.8	277.4	1065.9	26.0	620
Division Total	*1,830,487*	*5,113,801*	*35.8*	*7,384*	*26,387*	*28.0*	*1,002*
Bago East Division							
Bago	23,997	445,637	5.4	126.3	2798.3	4.5	24
Kawa	48,886	230,460	21.2	229.0	1079.4	21.2	450
Thanatpin	29,562	161,037	18.4	260.4	756.4	34.4	632
Waw	13,528	192,385	7.0	72.3	997.5	7.2	51
Division Total	*115,973*	*1,029,519*	*11.3*	*687.9*	*5631.6*	*12.2*	*138*
Mon Division							
Bilin	25,733	215,040	12.0	75.9	1797.2	4.2	51
Chaungzon	28,744	170,729	16.8	64.8	391.1	16.6	279
Kyaikto	7,493	174,537	4.3	33.9	851.1	4.0	17
Paung	37,867	273,974	13.8	122.3	881.3	13.9	192
Thaton	50,291	296,823	16.9	292.7	1392.0	21.0	356
Division Total	*150,129*	*1,131,103*	*13.3*	*590*	*5,313*	*11.1*	*147*

	Vulnerable Population	Total Population	Percent Population Affected	Vulnerable Land Area (sq km)	Total Land Area (sq km)	Percent Land Area Affected	Vulnerability Index Score
Yangon Division							
Ahlone	2,727	40,480	6.7	0.2	3.1	7.6	51
Bahan	6,378	81,173	7.9	0.5	7.8	6.6	52
Botahtaung	1,742	41,480	4.2	0.2	2.4	7.5	31
Dagon	3,119	60,876	5.1	0.3	4.9	5.1	26
E. Dagon Myothit	11,382	54,970	20.7	15.2	78.9	19.3	399
N. Dagon Myothit	64,856	222,686	29.1	7.0	23.0	30.5	889
Seikk Dagon Myothit	6,395	2,719,610	0.2	13.0	64.5	20.1	5
S. Dagon Myothit	36,651	178,590	20.5	14.7	83.1	17.7	363
Dala	71,618	133,310	53.7	16.2	33.3	48.6	2,613
Dawbon	11,554	40,429	28.6	1.2	4.2	29.5	843
Hlaing	13,108	121,745	10.8	1.1	9.4	11.3	122
Hlaingtharya	108,261	503,381	21.5	18.6	82.7	22.5	485
Hlegu	10,183	93,477	10.9	146.5	1516.3	9.7	105
Hmawbi	14,548	107,621	13.5	69.3	409.1	16.9	229
Htantabin	18,999	97,761	19.4	111.1	560.1	19.8	386
Insein	19,206	178,839	10.7	2.9	23.7	12.2	131
Kamaryut	4,403	81,163	5.4	0.4	6.3	5.7	31
Kawhmu	33,795	89,444	37.8	197.4	474.2	41.6	1,573
Kayan	21,628	180,479	12.0	67.7	603.6	11.2	134
Kungyangon	72,562	159,775	45.4	283.3	590.2	48.0	2,179
Kyauktada	609	882,635	0.1	0.0	0.7	6.7	0
Kyauktan	20,652	151,247	13.7	93.0	694.1	13.4	183
Kyeemyindaing	7,360	30,434	24.2	0.6	3.7	17.3	419
Lanmadaw	1,539	10,145	15.2	0.1	1.2	10.3	157
Latha	1,684	10,145	16.6	0.1	0.7	20.3	337
Mayangone	44,382	365,139	12.2	3.6	27.4	13.1	159
Mingaladon	9,115	117,369	7.8	14.9	133.6	11.1	87
Mingalartaungnyunt	12,793	56,640	22.6	1.2	5.0	23.1	521
North Okkalapa	7,465	51,514	14.5	5.2	26.6	19.7	285
Pabedan	1,104	10,145	10.9	0.1	0.6	14.0	152
Pazundaung	1,322	8,761	15.1	0.1	1.1	10.6	160
Sanchaung	2,453	20,308	12.1	0.2	2.6	7.5	91
Seikgyikanaungto	31,646	68,780	46.0	4.1	10.7	38.2	1,759
Seikkan	3,134	10,146	30.9	0.3	1.3	19.6	604
Shwepyithar	6,477	26,488	24.5	11.4	51.7	22.0	539
South Okkalapa	20,546	101,433	20.3	1.7	7.3	22.6	458
Taikkyi	31,562	231,065	13.7	176.7	1743.3	10.1	138
Tamwe	9,364	60,875	15.4	0.8	4.9	15.6	240
Thaketa	38,500	127,644	30.2	3.6	11.2	32.4	977
Thanlyin	18,957	166,377	11.4	49.9	490.8	10.2	116
Thingangkuun	17,927	147,346	12.2	1.6	12.2	13.1	160
Thongwa	21,604	180,081	12.0	96.6	817.8	11.8	142
Twantay	258,864	794,604	32.6	158.4	914.5	17.3	564
Yankin	6,815	71,023	9.6	0.6	4.7	11.7	112
Division Total	*1,108,987*	*8,887,633*	*12.5*	*787.5*	*1591.6*	*49.5*	*617*

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