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The exact death toll of the 1945 atomic bombings of Hiroshima and Nagasaki is not known. Reports say the total combined death toll of the cities is between 129,000-240,000 while others say it could be higher. What we do know, is that in August of 1945, the United States military dropped a new type of bomb on Hiroshima. The atomic bomb used was called “Little Boy.” Sixteen hours after the bomb was dropped, President Truman asked Japan to surrender. When they didn’t agree, the United States dropped another atomic bomb, this time on Nagasaki. The second bombing occurred just three days after the bombing of Hiroshima. About half of the deaths occurred the first day when the bombs were detonated. The atomic bombs were detonated in the sky, a little over 1,500 feet above the ground. This allowed for optimal destruction. The remaining deaths occurred over the next few months, and years. Many of these lives were taken due to burns, radiation, and cancer. The long-term effects of the bombings are something that has been studied time and time again. In 1945, no one really knew how it would affect the people or the environment. Many expected the cities to become nuclear wastelands, something you might see in a video game or a movie. This was not so, but the people and their future generations did suffer. Here are several of the long term effects, caused by the atomic bombings on the two cities. A B-29 over Osaka on June 1, 1945. Leukemia Increased Over the next few years, the cities would see a spike in leukemia. This was the most deadly long-term side effect. The spike occurred around two years after the bombing and hit its peak around 1950. It has been estimated that those involved in the blast had a 46 percent chance of getting leukemia. Other types of cancer did see a spike in the amount of diagnosis, it just didn’t occur until around 1955. Other cancers that saw an increase were thyroid cancer, lung cancer, and breast cancer. Women were more likely to developed thyroid cancer, which was diagnosed by doing an autopsy. The first case of thyroid cancer in regards to the blast wasn’t reported until 1957. Lung cancer was linked to the bombings in the early 1950s, and in a 1972 survey, almost 3,800 people (of 10,412) who had died from the blast or related to the blast, were found to have developed lung cancers. Urakami Tenshudo. Lastly, there was an increase in breast cancer. Women aged 22-30 were at a higher risk of getting breast cancer if they were exposed to more than 100 rads. It was believed that those exposed to radiation were three times as likely to develop breast cancer, than someone who wasn’t exposed to radiation. Increase in Anemia There was a noted increase in patients with anemia, which is a disease where your blood doesn’t create enough red blood cells. The effects of this lasted as long as ten years in some individuals. Hiroshima before the bombing. Increase in Cataracts Cataracts are when the lens of the eye becomes foggy. This can take several years to develop, and was first found to be an issue three years after the bombs were dropped. Age and distance to the bomb played a big factor in those who developed cataracts. In the mid-1950s, at the Hiroshima Red Cross Hospital, there were 435 survivors screened, and 116 had developed cataracts. Of that 116, 87 were within two kilometers of the bomb blast. Cataracts in patients were caused by high radiation levels. Keloids In 1946, keloids began to develop. This is where a scar is healing and essentially heals too much, causing it to swell, and can result in abnormal growth. It is believed this is caused by radiation. The scar tissue that would grow would end up looking similar to a crab, which is where the growth gets its name from. Keloid is Ancient Greek for crab. Those who were within one kilometer of the blast were 60 percent more likely to develop the keloids on their burn wounds. Hiroshima after the bombing. Birth Complications There were only a handful of surveys of this, but one completed in Nagasaki showed a high rate of infant and neonatal deaths. The survey looked at 98 pregnant women who were exposed within 2 kilometers of the blast, as well as 113 women who had been exposed further away from where the bomb was dropped. The survey also noted that one in four babies born by survivors that were surveyed had cognitive disabilities. These children suffered in physical growth and development as well. Some of the children grew to be underweight and were born with microcephaly – a condition in which the head is smaller than it should be. Microcephaly can’t be cured, but it can be treated. Of total babies born, the number of birth defects was not unusual. Effects on The Environment When the bombs were dropped, everything was decimated. Everyone was worried the cities would become nuclear waste fields, where nothing could grow and there would be too much radiation for it to be safe to live. In 1946, there was some hope. The oleander flower began to grow, and the cities began to rebuild with help from Japan. Over time, the radiation levels have dropped, and today are considered safe. Hiroshima Peace Memorial (domed structure), survived the blast due to its thick, concrete structure. Dan Smith – CC BY-SA 2.5 The cities have long since been rebuilt and are thriving. As of 2010, Hiroshima had a population of 1.2 million. While Nagasaki had a population in 2009 of 446,000. The rebuilding of Nagasaki was slow. The first emergency temporary homes were not completed until 1946. One man not only survived the blast in Hiroshima, he also survived the blast in Nagasaki as well. Tsutomu Yamaguchi was employed by Mitsubishi Heavy Industries and was a resident of Nagasaki. On August 6th, 1945, he was sent to Hiroshima to business. Yamaguchi survived the blast and went home to Nagasaki the next day with wounds. He returned to work in Nagasaki on August 9th, 1945. That morning he said that he was telling his supervisor of a bomb that destroyed the whole town, the supervisor couldn’t believe him. Yamaguchi claims that at the end of this conversation, the A-bomb was detonated over Nagasaki. Yamaguchi was recognized by Japan for surviving in both cities where atomic bombs were dropped, he died of stomach cancer in 2010 at the age of 93. The long-term effects of the bombings were felt through the landscape, the environment, and the people. Today, radiation levels are considered low and safe. While the towns have been rebuilt, you can still find some traces of the horror from the bombs in August of 1945. Lincoln Riddle is one of the authors writing for WAR HISTORY ONLINE A single atomic bomb, the first weapon of its type ever used against a target, exploded over the city of Hiroshima at 0815 on the morning of 6 August 1945. Most of the industrial workers had already reported to work, but many workers were enroute and nearly all the school children and some industrial employees were at work in the open on the program of building removal to provide firebreaks and disperse valuables to the country. The attack came 45 minutes after the "all clear" had been sounded from a previous alert. Because of the lack of warning and the populace's indifference to small groups of planes, the explosion came as an almost complete surprise, and the people had not taken shelter. Many were caught in the open, and most of the rest in flimsily constructed homes or commercial establishments. The bomb exploded slightly northwest of the center of the city. Because of this accuracy and the flat terrain and circular shape of the city, Hiroshima was uniformly and extensively devastated. Practically the entire densely or moderately built-up portion of the city was leveled by blast and swept by fire. A "fire-storm," a phenomenon which has occurred infrequently in other conflagrations, developed in Hiroshima: fires springing up almost simultaneously over the wide flat area around the center of the city drew in air from all directions. The inrush of air easily overcame the natural ground wind, which had a velocity of only about 5 miles per hour. The "fire-wind" attained a maximum velocity of 30 to 40 miles per hour 2 to 3 hours after the explosion. The "fire-wind" and the symmetry of thebuilt-up center of the city gave a roughly circular shape to the 4.4 square miles which were almost completely burned out. The surprise, the collapse of many buildings, and the conflagration contributed to an unprecedented casualty rate. Seventy to eighty thousand people were killed, or missing and presumed dead, and an equal number were injured. The magnitude of casualties is set in relief by a comparison with the Tokyo fire raid of 9-10 March 1945, in which, though nearly 16 square miles were destroyed, the number killed was no larger, and fewer people were injured. At Nagasaki, 3 days later, the city was scarcely more prepared, though vague references to the Hiroshima disaster had appeared in the newspaper of 8 August. From the Nagasaki Prefectural Report on the bombing, something of the shock of the explosion can be inferred: The day was clear with not very much wind--an ordinary midsummer's day. The strain of continuous air attack on the city's population and the severity of the summer had vitiated enthusiastic air raid precautions. Previously, a general alert had been sounded at 0748, with a raid alert at 0750; this was canceled at 0830, and the alertness of the people was dissipated by a great feeling of relief. The city remained on the warning alert, but when two B-29's were again sighted coming in the raid signal was not given immediately; the bomb was dropped at 1102 and the raid signal was given a few minutes later, at 1109. Thus only about 400 people were in the city's tunnel shelters, which were adequate for about 30 percent of the population. When the atomic bomb exploded, an intense flash was observed first, as though a large amount of magnesium had been ignited, and the scene grew hazy with white smoke. At the same time at the center of the explosion, and a short while later in other areas, a tremendous roaring sound was heard and a crushing blast wave and intense heat were felt. The people of Nagasaki, even those who lived on the outer edge of the blast, all felt as though they had sustained a direct hit, and the whole city suffered damage such as would have resulted from direct hits everywhere by ordinary bombs. The zero area, where the damage was most severe, was almost completely wiped out and for a short while after the explosion no reports came out of that area. People who were in comparatively damaged areas reported their condition under the impression that they had received a direct hit. If such a great amount of damage could be wreaked by a near miss, then the power of the atomic bomb is unbelievably great. Nagasaki, Japan After Atomic Bombing ... 'Like A Graveyard With Not A Tombstone Standing' Nagasaki Prefecture Report In Nagasaki, no fire storm arose, and the uneven terrain of the city confined the maximum intensity of damage to the valley over which the bomb exploded. The area of nearly complete devastation was thus much smaller; only about 1.8 square miles. Casualties were lower also; between 35,000 and 40,000 were killed, and about the same number injured. People in the tunnel shelters escaped injury, unless exposed in the entrance shaft. The difference in the totals of destruction to lives and property at the two cities suggests the importance of the special circumstances of layout and construction of the cities, which affect the results of the bombings and must be considered in evaluating the effectiveness of the atomic bombs. An account of the nature and history of each city will give meaning to the details of the damage and disorganization at each. 2. Hiroshima The city of Hiroshima is located on the broad fan-shaped delta of the Ota River, whose 7 mouths divide the city into 6 islands which project fingerlike into Hiroshima Bay of the Inland Sea. These mouths of the river furnished excellent firebreaks in a city that is otherwise flat and only slightly above sea level. A highly developed bridge system, with 81 important bridges, joined the islands. A singlekidney shaped hill in the eastern part of the city, about one-half mile long and rising to an elevation of 221 feet, offered some blast protection to structures on the eastern side opposite the point of fall of the bomb. Otherwise, the city was uniformly exposed to the spreading energy from the bomb. The city boundary extends to some low hills to the west and northeast and embraces 26.36 square miles, only 13 of which were built up. Seven square miles were densely or moderately built up, the remainder being occupied by sparsely built-up residential, storage, and transportation areas, vegetable farms, water courses, and wooded hilly sections. In the central area, no systematic separation of commercial, industrial, and residential zones existed, though there were rough functional sections. The main commercial district was located in the center of the city, and with the adjoining Chugoku Regional Army Headquarters occupied the greater portion of the central area. The bulk of the industries was located on the perimeter of the city, either on the southern ends of the islands (where the Hiroshima airport was also situated) or to the east of the city. The 4 square miles of densely built-up area in the heart of the city--residential, commercial, and military--contained three-fifths of the total population. If there were, as seems probable, about 245,000 people in the city at the time of the attack, the density in the congested area must have been about 35,000 per square mile. Five completed evacuation programs and a sixth then in progress had reduced the population from its wartime peak of 380,000. In Hiroshima (and in Nagasaki also) the dwellings were of wood construction; about one-half were one story and the remainder either one and one-half or two stories. The roof coverings were mostly hard-burnt black tile. There were no masonry division walls, and large groups of dwellings clustered together. The type of construction, coupled with antiquated fire-fighting equipment and inadequately trained personnel, afforded even in peacetime a high possibility of conflagration. Many wood-framed industrial buildings were of poor construction by American standards. The principal points of weakness were the extremely small tenons, the inadequate tension joints, and the inadequate or poorly designed lateral bracings. Reinforced concrete framed buildings showed a striking lack of uniformity in design and in quality of materials. Some of the construction details (reinforcing rod splices, for example) were often poor, and much of the concrete was definitely weak; thus some reinforced concrete buildings collapsed and suffered structural damage when within 2,000 feet of ground zero, and some internal wall paneling was demolished even up to 3,800 feet. (For convenience, the term "ground zero" will be used to designate the point on the ground directly beneath the point of detonation, or "air zero.") Other buildings, however, were constructed far more strongly than is required by normal building codes in America, to resist earthquakes. Furthermore, construction regulations in Japan have specified since the 1923 earthquake that the roof must safely carry a minimum load of 70 pounds per square foot whereas American requirements do not normally exceed 40 pounds per square foot for similar types. Though the regulation was not always followed, this extra strong construction was encountered in some of the buildings near ground zero at Hiroshima, and undoubtedly accounts for their ability to withstand atomic bomb pressures without structural failures. Nearly 7 percent of the residential units had been torn down to make firebreaks. Hiroshima before the war was the seventh largest city in Japan, with a population of over 340,000, and was the principal administrative and commercial center of the southwestern part of the country. As the headquarters of the Second Army and of the Chugoku Regional Army, it was one of the most important military command stations in Japan, the site of one of the largest military supply depots, and the foremost military shipping point for both troops and supplies. Its shipping activities had virtually ceased by the time of the attack, however, because of sinkings and the mining of the Inland Sea. It had been relatively unimportant industrially before the war, ranking only twelfth, but during the war new plants were built that increased its significance. These factories were not concentrated, but spread over the outskirts of the city; this location, we shall see, accounts for the slight industrial damage. The impact of the atomic bomb shattered the normal fabric of community life and disrupted the organizations for handling the disaster. In the 30 percent of the population killed and the additional 30 percent seriously injured were included corresponding proportions of the civic authorities and rescue groups. A mass flight from the city took place, as persons sought safety from the conflagration and a place for shelter and food. Within 24 hours, however, people were streaming back by the thousands in search of relatives and friends and to determine the extent of their property loss. Road blocks had to be set up along all routes leading into the city, to keep curious and unauthorized people out. The bulk of the dehoused population found refuge in the surrounding countryside; within the city the food supply was short and shelter virtually nonexistent. On 7 August, the commander of the Second Army assumed general command of the counter measures, and all military units and facilities in the area were mobilized for relief purposes. Army buildings on the periphery of the city provided shelter and emergency hospital space, and dispersed Army supplies supplemented the slight amounts of food and clothing that had escaped destruction. The need far exceeded what could be made available. Surviving civilians assisted; although casualties in both groups had been heavy, 190 policemen and over 2,000 members of the Civilian Defense Corps reported for duty on 7 August. The status of medical facilities and personnel dramatically illustrates the difficulties facing authorities. Of more than 200 doctors in Hiroshima before the attack, over 90 percent were casualties and only about 30 physicians were able to perform their normal duties a month after the raid. Out of 1,780 nurses, 1,654 were killed or injured. Through some stocks of supplies had been dispersed, many were destroyed. Only three out of 45 civilian hospitals could be used, and two large Army hospitals were rendered unusable. Those within 3,000 feet of ground zero were totally destroyed, and the mortality rate of the occupants was practically 100 percent. Two large hospitals of reinforced concrete construction were located 4,900 feet from ground zero. The basic structures remained erect but there was such severeinterior damage that neither was able to resume operation as a hospital for some time and the casualty rate was approximately 90 percent, due primarily to falling plaster, flying glass, and fire. Hospitals and clinics beyond 7,000 feet, though often remaining standing, were badly damaged and contained many casualties from flying glass or other missiles. With such elimination of facilities and personnel, the lack of care and rescue activities at the time of the disaster is understandable; still, the eyewitness account of Father Siemes (German-born Jesuit professor at Jochi University, Tokyo; in the Hiroshima area when the bomb fell.) shows how this lack of first-aid contributed to the seriousness of casualties. At the improvised first-aid stations, he reports: "Iodine is applied to the wounds but they are left uncleansed. Neither ointment nor other therapeutic agents are available. Those that have been brought in are laid on the floor and no one can give them any further care. What could one do when all means are lacking? Among the passerby, there are many who are uninjured. In a purposeless, insensate manner, distraught by the magnitude of the disaster, most of them rush by and none conceives the thought of organizing help on his own initiative. They are concerned only with the welfare of their own families--in the official aid stations and hospitals, a good third or half of those that had been brought in died. They lay about there almost without care, and a very high percentage succumbed. Everything was lacking, doctors, assistants, dressings, drugs, etc." Effective medical help had to be sent in from in the outside, and arrived only after a considerable delay. Fire-fighting and rescue units were equally stripped of men and equipment. Father Siemes reports that 30 hours elapsed before any organized rescue parties were observed. In Hiroshima, only 16 pieces of fire-fighting equipment were available for fighting the conflagration, three of them borrowed. However, it is unlikely that any public fire department in the world, even without damage to equipment or casualties to personnel, could have prevented development of a conflagration in Hiroshima, or combated it with success at more than a few locations along its perimeter. The total fire damage would not have been much different. Hiroshima before and after bombing. Area around ground zero. 1,000-foot circles. All utilities and transportation services were disrupted over varying lengths of time. In most cases, however, the demand fell off even more precipitously than the available supply, and where the service was needed it could be restored at a minimal level. Thus, through railroad service was possible on 8 August, only 2 days after the attack, when fire trucks still had to be used to pump water into the locomotives because of insufficient water pressure. Electric power from the general network was available in most of the surviving parts of the city on 7 August, and only one plant, the Engineering Division of Mitsubishi Heavy Industries, was hampered in its recovery by the inability to obtain sufficient power for several weeks. The water reservoir, which was of reinforced concrete and earth-covered, was undamaged; it was nearly 2 miles from the blast center. However, 70,000 breaks of pipe connections in buildings and dwellings were caused by blast and fire effects. No subsurface pipes were crushed and no leaks resulted from blast as a direct cause, though several leaks in underground mains resulted from falling debris. Pressure in the city center dropped to zero because of the connection breaks and the damage to a 16- and a 14-inch water main where they crossed damaged bridges. Sex sewer pumping stations were rendered inoperable by fire and blast within a radius of 1 mile. The remaining eight stations were only slightly damaged, but no effort was made to repair or operate them. Water tables rose at flood periods and lands behind revetments were inundated. Trolley cars, trucks, and railroad rolling stock suffered extensive damage. Transportation buildings (offices, stations, living quarters, and a few warehouses) were damaged by fire in the passenger station area, but damage was slight to the roundhouses, transit sheds, warehouses, and repair units in the classification and repair area. About 200 railroad employees were killed, but by 20 August, 14 days after the attack, 80 percent of the employees were at work. The electric power transmission and distribution system was wrecked; only power equipment of rugged construction, such as transformers, resisted the blast and heat within the devastated areas. Instruments were damaged beyond repair, and switches, switchyard insulators, cables, and copper bus work were rendered unusable. The telephone system was approximately 80 percent damaged, and no service was restored until 15 August 1945. Industry in the center of the city was effectively wiped out. Though small workshops numbered several thousand, they represented only one-fourth of the total industrial production of Hiroshima, since many of them had only one or two workers. The bulk of the city's output came from large plants located on the outskirts of the city; one-half of the industrial production came from only five firms. Of these larger companies, only one suffered more than superficial damage. Of their working force, 94 percent were uninjured. Since electric power was available, and materials and working force were not destroyed, plants ordinarily responsible for nearly three-fourths of Hiroshima's industrial production could have resumed normal operation within 30 days of the attack had the war continued. Immediately after the attack, the presence of these nearly intact industries spurred countermeasures in an effort to retain for the nation's war effort the potential output of the city. The prefectural governor issued a proclamation on 7 August, calling for "a rehabilitation of the stricken city and an aroused fighting spirit to exterminate the devilish Americans." To prevent the spread of rumors and brace morals, 210,000 out-of-town newspapers were brought in daily to replace the destroyed local paper. With the surrender, however, reconstruction took on a slower tempo. On 16 August, regular rationing was resumed. Care of the injured and disposal of corpses remained urgent, but other steps were few. By 1 November, the population of Hiroshima was back to 137,000. The city required complete rebuilding. The entire heart, the main administrative and commercial as well as residential section, was gone. In this area only about 50 buildings, all of reinforced concrete, remained standing. All of these suffered blast damage and all save about a dozen were almost completely gutted by fire; only 5 could be used without major repairs. These burnt-out structural frames rose impressively from the ashes of the burned-over section where occasional piles of rubble or twisted steel skeletons marked the location of brick or steel frame structures. At greater distances light steel frame and brick structures remained undamaged. Blast damage to wood-frame buildings and to residences extended well beyond the burned-over area, gradually becoming more erratic and spotty as distances were reached where only the weakest buildings were damaged, until in the outer portions of the city only minor disturbances of the tile roofs or breakage of glass were visible. The official Japanese figures summed up the building destruction at 62,000 out of a total of 90,000 buildings in the urban area, or 69 percent. An additional 6,000 or 6.6 percent were severely damaged, and most of the others showed glass breakage or disturbance of roof tile. These figures show the magnitude of the problem facing the survivors. Despite the absence of sanitation measures, no epidemics are reported to have broken out. In view of the lack of medical facilities, supplies, and personnel, and the disruption of the sanitary system, the escape from epidemics may seem surprising. The experience of other bombed cities in Germany and Japan shows that this is not an isolated case. A possible explanation may lie in the disinfecting action of the extensive fires. In later weeks, disease rates rose, but not sharply. 3. Nagasaki Nagasaki is located on the best natural harbor of western Kyushu, a spacious inlet in the mountainous coast. The city is a highly congested urban pattern extending for several miles along the narrow shores and up the valleys opening out from the harbor. Two rivers, divided by a mountain spur, form the two main valleys in whose basins the city lies: the Urakami River, in whose basin the atomic bomb fell, running into the harbor from a NNW direction, and the Nakashima River, running from the NE. This mountain spur and the irregular layout of the city effectively reduced the area of destruction. The main residential and commercial districts are intermingled in these two river basins. The large industrial plants stretch up the west shore of the bay and up the Urakami Valley. Though the metropolitan area of the city is officially about 35 square miles and stretches far into the countryside, the heavily built-up area is confined by the terrain to less than 4 square miles. The greatest population density thus approximated 65,000 per square mile even after the evacuations. Despite its excellent harbor, Nagasaki's commercial importance, though great in previous centuries, had declined in recent years because of the city's isolated peninsular position and the difficulties of transportation through the mountains by inadequate roads and railroad facilities. As a naval base it had been supplanted by Sasebo. Industry gradually increased in importance, primarily under Mitsubishi influence. The four largest companies in the city were the Mitsubishi Shipyards, Electrical Equipment Works, Arms Plant, and Steel Works, employing nearly 90 percent of the city's labor force. Administratively, Nagasaki was by 1941 of merely local importance despite being the seat of the prefectural government. Ground zero at Nagasaki - Before and after the bombing. Before the atomic bombing on 9 August, Nagasaki had experienced five small-scale air attacks in the previous 12 months, by an aggregate of 136 planes which dropped a total of 270 tons of high explosive, 53 tons of incendiary, and 20 tons of fragmentation bombs. Of these, a raid of 1 August 1945 was most effective, with several bombs falling in the Mitsubishi Shipyards and Steel Works. The scale of effect can be roughly measured, however, by comparing the toll of building damage with that from the atomic bomb; in all these raids 276 residential buildings and 21 industrial buildings were destroyed or badly damaged. When the atomic bomb fell, Nagasaki was comparatively intact. Because the most intense destruction was confined to the Urakami Valley, the impact of the bomb on the city as a whole was less shattering than at Hiroshima. In addition, no fire storm occurred; indeed, a shift in wind direction helped control the fires. Medical personnel and facilities were hard-hit, however. Over 80 percent of the city's hospital beds and the Medical College were located within 3,000 feet of the center of the explosion, and were completely destroyed. Reinforced concrete buildings within this range, though standing , were completely gutted by fire; buildings of wooden construction were destroyed by fire and blast. The mortality rate in this group of buildings was between 75 and 80 percent. Exact casualty figures for medical personnel are unknown, but the city seems to have fared better than Hiroshima: 120 doctors were at work on 1 November, about one-half of the prepaid roster. Casualties were undoubtedly high: 600 out of 850 medical students at the Nagasaki Medical College were killed and most of the others injured; and of the 20 faculty members, 12 were killed and 4 others injured. Utilities and services were again disrupted. Both gas plants were destroyed, and the replacement time was estimated at several months. Though the basic water supply was not affected, thousands of residential feeder-line breaks were supplemented by eight breaks on a 14-inch main line and four breaks where another main line crossed a bridge. Electric power distribution and transmission systems were effectively destroyed in the area of heaviest destruction, but power could be supplied to the other parts of the city almost immediately. Shipping was virtually unaffected. Trolley service was halted both by the interruption in power supply and by damage to street cars. Nagasaki is at the end of a railroad spur line. The major damage was sustained by track and railroad bridges. The rails buckled intermittently for a bridges. The rails buckled intermittently for a distance of 5,000 to 7,500 feet from ground zero, at points where burning debris set fire to wooden cross ties. Three bridges were displaced; rails were distorted and the tracks had to be completely rebuilt. The railroad stations were completely destroyed by blast and fire and the electric signal destroyed by blast and fire and the electric signal system was severely damaged. Rolling stock was slightly damaged, primarily by fire. Although the damage to equipment was not extensive, it was severe enough to curtail traffic for 48 hours, during which time sufficient emergency repair work was performed to permit resumption of limited traffic. Control of relief measures was in the hands of the prefecture. The sequence of clearance and repair activities illustrates the activities that were carried on. The city's repair facilities were completely disorganized by the atomic bomb, so that with the single exception of shutting off water to the affected areas no repairs were made to roads, bridges, water mains, or transportation installations by city forces. The prefecture took full responsibility for such restoration as was accomplished, delegating to the scattered city help the task of assisting in relief of victims. There were only 3 survivors of 115 employees of the street car company, and late as the middle of November 1945 no cars were running. A week after the explosion, the water works officials made an effort to supply water to persons attempting to live in the bombed-out areas, but the leakage was so great that the effort was abandoned. It fell to the prefecture, therefore, to institute recovery measures even in those streets normally the responsibility of the city. Of the entire public works construction group covering the Nagasaki city area, only three members appeared for work and a week was required to locate and notify other survivors. On the morning of 10 August, police rescue units and workers from the Kawaminami shipbuilding works began the imperative task of clearing the Omura-Nagasaki pike, which was impassable for 8,000 feet. A path 6 ½ feet wide was cleared despite the intense heat from smoldering fires, and by 15 August had been widened to permit two-way traffic. No trucks, only rakes and shovels, were available for clearing the streets, which were filled with tile, bricks, stone, corrugated iron, machinery, plaster, and stucco. Street areas affected by blast and not by fire were littered with wood. Throughout the devastated area, all wounded had to be carried by stretcher, since no motor vehicles were able to proceed through the cluttered streets for several days. The plan for debris removal required clearance of a few streets leading to the main highway; but there were frequent delays caused by the heat of smoldering fires and by calls for relief work. The debris was simply raked and shoveled off the streets. By 20 August the job was considered complete. The streets were not materially damaged by the bomb nor were the surface or the abutments of the concrete bridges, but many of the wooden bridges were totally or partially destroyed by fire. Under the circumstances--fire, flight of entire families, destruction of official records, mass cremation--identification of dead and the accurate count of casualties was impossible. As at Hiroshima, the season of the year made rapid disposal of bodies imperative, and mass cremation and mass burial were resorted to in the days immediately after the attack. Despite the absence of sanitary measures, no epidemics broke out here. The dysentery rate rose from 25 per 100,000 to 125 per 100,000. A census taken on 1 November 1945 found a population of 142,700 in the city. At Nagasaki, the scale of destruction was greater than at Hiroshima, though the actual area destroyed was smaller because of the terrain and the point of fall of the bomb. The Nagasaki Prefectural Report describes vividly the impress of the bomb on the city and its inhabitants: Within a radius of 1 kilometer from ground zero, men and animals died almost instantaneously from the tremendous blast pressure and heat; houses and other structures were smashed, crushed and scattered; and fires broke out. The strong complex steel members of the structures of the Mitsubishi Steel Works were bent and twisted like jelly and the roofs of the reinforcedconcrete National Schools were crumpled and collapsed, indicating a force beyond imagination. Trees of all sizes lost their branches or were uprooted or broken off at the trunk. Outside a radius of 1 kilometer and within a radius of 2 kilometers from ground zero, some men and animals died instantly from the great blast and heat, but the great majority were seriously or superficially injured. Houses and other structures were completely destroyed while fires broke out everywhere. Trees were uprooted and withered by the heat. Outside a radius of 2 kilometers and within a radius of 4 kilometers from ground zero, men and animals suffered various degrees of injury from window glass and other fragments scattered about by the blast and many were burned by the intense heat. Dwelling and other structures were half damaged by blast. Outside a radius of 4 kilometers and within a radius of 8 kilometers from the ground zero, living creatures were injured by materials blown about by the blast; the majority were only superficially wounded. Houses were half or only partially damaged. Residential Area - Nagasaki, Japan. Shielded By Hills, One Congested Area Survived The Atomic Blast. Note Firebreak In The Foreground. Residential Area - Another, 1,000 feet northeast of ground zero was reduced to rubble. While the conflagration with its uniformly burnt-out area caught the attention at Hiroshima, the blast effects, with their resemblance to the aftermath of a hurricane, were most striking at Nagasaki. Concrete buildings had their sides facing the blast stove in like boxes. Long lines of steel-framed factory sheds, over a mile from ground zero, leaned their skeletons away from the explosion. Blast resistant objects such as telephone poles leaned away from the center of the explosion; on the surrounding hills trees were blown down within considerable areas. Although there was no general conflagration, fires contributed to the total damage in nearly all concrete structures. Evidence of primary fire is more frequent than at Hiroshima. Because parts of the city were protected by hills, more than one-half of the residential units escaped serious damage. Of the 52,000 residential units in the city on 1 August, 14,146 or 27.2 percent were completely destroyed (by Japanese count) (11,494 of these were burned) ; 5,441 or 10.5 percent were half-burned or destroyed; many of the remaining units suffered superficial or minor damage. In 558 nonresidential buildings in the built-up area of Nagasaki which the Survey studied, almost 60 percent of the usable floor area was destroyed or structurally damaged. Only 12 percent was undamaged, the rest suffering superficial or minor damage. The survival of a higher percentage of the buildings, then, distinguishes Nagasaki from Hiroshima, so also, on the other hand, does the damage to factories. In Nagasaki, only the Mitsubishi Dockyards among the major industries was remote enough from the explosion to escape serious damage. The other three Mitsubishi firms, which were responsible together with the dockyards for over 90 percent of the industrial output of the city, were seriously damaged. The Arms Plant and the Steel Works were in the main area of damage. Plant officials estimated that 58 percent of the value of the former and 78 percent of the value of the latter were destroyed : Survey investigators considered the two plants to be 50 percent destroyed. The Mitsubishi Electric Works were on the edge of the main area of destruction, but suffered 10 percent structural damage. One or two paragraphs from the report of the commanding officer of Sasebo Naval District will illustrate the sort of damage done to industrial installations. Of two plants of the Mitsubishi Arms Works, he reports: With the exception of the tunnel workshops and the half-underground workshops, the Ohashi and Mori Machi Plants were completely destroyed by collapse. Reinforced concrete structures in these plants were severely damaged internally--ceilings collapsed, fittings of all sorts were destroyed, and equipment was damaged. Casting and forging shops in the Ohashi Plant were destroyed by fire, which broke out in those structures. The Mori Machi Plant was nearly completely destroyed by fire. Taking both plants together, 60 percent of the machinery installations was damaged. In the Ohashi Plant, from 80 to 90 percent of the machinery can be used again; in the Mori Machi Plant only 40 to 50 percent of the machinery can be used in the future. THE MITSUBISHI STEEL WORKS: The tremendous pressure of the atomic blast bent the steel frame of the Mitsubishi Steel Works (about 2,400 feet south of ground zero at Nagasaki) away from explosion. Nagasaki Medical University Hospital in background. Plant structures here (some north-light steel framed structures) suffered extensive damage to roofs and walls as steel plates were blown off. The frames themselves were bent, twisted or toppled over, and several buildings caught fire. Hardly any of the machinery in the plant can be used again in its present condition. However, nearly 70 percent of the machinery can be repaired. In general, (as has proved true with high explosive or incendiary bombs also) the damage to machinery and other contents of a factory was less than damage to the buildings. In addition, the air burst of the atomic bomb meant that it acted indirectly on machine tools and other building contents. Though a few tools were blown over by blast, almost all the serious damage was caused by debris from damaged buildings, overturning through mass movement of buildings, or burning of buildings. Thus the extent and sort of damage to machinery depended on the construction of the buildings housing them. In wood-frame buildings, 95 percent of the machines were seriously damaged, but in reinforced concrete or steel framed buildings only one-third or one-fourth of the machines were affected seriously. As would be expected, fire caused much damage to machines in timber framed shops (practically all of which were destroyed up to 7,000 feet from ground zero) and some damage in other types of structure. Debris was a major cause of damage only in certain reinforced concrete buildings, where walls and roofs collapsed. Shortage of raw materials had reduced operations at these four Mitsubishi plants to a fraction of their capacity. Had the raw material situation been normal and had the war continues, it is estimated that restoration of production would have been possible though slow. The dockyard, which was affected mainly by the 1 August attack rather than by the atomic bomb, would have been able to produce at 80 percent of full capacity within 3 or 4 months. The steel works would have required a year to get into substantial production the electric works could have resumed production at a reduced rate within 2 months and been back at capacity within 6 months, and the arms plants would have required 15 months to reach two-thirds of their former capacity. B. General Effects 1. Casualties The most striking result of the atomic bombs was the great number of casualties. The exact number of dead and injured will never be known because of the confusion after the explosions. Persons unaccounted for might have been burned beyond recognition in the falling buildings, disposed of in one of the mass cremations of the first week of recovery, or driven out of the city to die or recover without any record remaining. No sure count of even the prepaid populations existed. Because of the decline in activity in the two port cities, the constant threat of incendiary raids, and the formal evacuation programs of the Government, an unknown number of the inhabitants had either drifter away from the cities or been removed according to plan. In this uncertain situation, estimates of casualties have generally ranged between 100,000 and 180,000 for Hiroshima, and between 50,000 and 100,000 for Nagasaki. The Survey believes the dead at Hiroshima to have been between 70,000 and 80,000, with an equal number injured; at Nagasaki over 35,000 dead and somewhat more than that injured seems the most plausible estimate. Most of the immediate casualties did not differ from those caused by incendiary or high-explosive raids. The outstanding difference was the presence of radiation effects, which became unmistakable about a week after the bombing. At the time of impact, however, the causes of death and injury were flash burns, secondary effects of blast and falling debris, and burns from blazing buildings. No records are available that give the relative importance of the various types of injury, especially for those who died immediately after the explosion. Indeed, many of these people undoubtedly died several times over, theoretically, since each was subjected to several injuries, andy one of which would have been fatal. The Hiroshima prefectural health department placed the proportion of deaths from burns (flash or flame) at 60 percent, from falling debris at 30 percent, and from other injuries at 10 percent; it is generally agreed that burns caused at least 50 percent of the initial casualties. Of those who died later, an increasing proportion succumbed to radiation effects. The seriousness of these radiation effects may be measured by the fact that 95 percent of the traced survivors of the immediate explosion who were within 3,000 feet suffered from radiation disease. Colonel Stafford Warren, in his testimony before the Senate Committee on Atomic Energy, estimated that radiation was responsible for 7 to 8 percent of the total deaths in the two cities. Most medical investigators who spent some time in the areas feel that this estimate is far too low; it is generally felt that no less than 15 to 20 percent of the deaths were from radiation. In addition, there were an equal number who were casualties but survived, as well as uncounted thousands who probably were affected by the gamma rays but not enough to produce definite illness. A plausible estimate of the importance of the various causes of death would range as follows: Flash burns, 20 to 30 percent. Other injuries, 50 to 60 percent. Radiation sickness, 15 to 20 percent. If we examine the nature of the casualties under each group of causes we find familiar and unfamiliar effects. Protection against radiant heat from atomic bomb blast. this patient (photographed by Japanese, 2 October 1945) was about 6,500 feet from ground zero when the rays struck him from the left. His cap was sufficient to protect the top of his head against flash burns. Flash burns.--The flash of the explosion, which was extremely brief, emitted radiant heat travelling at the speed of light. Flash burns thus followed the explosion instantaneously. The fact that relatively few victims suffered burns of the eyeballs should not be interpreted as an indication that the radiant heat followed the flash, or that time was required to build up to maximum heat intensity. The explanation is simply that the structure of the eye is more resistant to heat than is average human skin, and near ground zero the recessed position of the eyeball offered protection from the overhead explosion. Peak temperatures lasted only momentarily. Survivors in the two cities stated that people who were in the open directly under the explosion of the bomb were so severely burned that the skin was charred dark brown or black and that they died within a few minutes or hours. Among the survivors, the burned areas of the skin showed evidence of burns almost immediately after the explosion. At first there was marked redness, and other evidence of thermal burns appeared within the next few minutes or hours, depending on the degree of the burn. Uninfected burns healed promptly without any unusual clinical features, according to the Japanese physicians who attended the cases. American medical observers noted only a tendency to formation of excess scar tissue, which could be satisfactorily explained as the result of malnutrition and the large degree of secondary infection that complicated healing of the burns. There were also a few instances of burns healing with contractures and limitation of the mobility of certain joints, such as the elbows or knees. In many instances, these primary burns of minor nature were completely healed before patients developed evidence of radiation effects. Because of the brief duration of the flash wave and the shielding effects of almost any objects--leaves and clothing as well as buildings--there were many interesting cases of protection. The radiant heat came in a direct line like light, so that the area burned corresponded to this directed exposure. Persons whose sides were toward the explosion often showed definite burns of both sides of the back while the hollow of the back escaped. People in buildings or houses were apparently burned only if directly exposed through the windows. The most striking instance was that of a man writing before a window. His hands were seriously burned but his exposed face and neck suffered only slight burns due to the angle of entry of the radiant heat through the window. Flash burns were largely confined to exposed areas of the body, but on occasion would occur through varying thicknesses of clothing the more likely it was to give complete protection against flash burns. One woman was burned ober the shoulder except for a T-shaped area about one-fourth inch in breadth; the T-shaped area corresponded to an increased thickness of the clothing from the seam of the garment. Other people were burned through a single thickness of kimono but were unscathed or only slightly affected underneath the lapel. In other instances, skin was burned beneath tightly fitting portions. Finally, white or light colors reflected heat and afforded some protection; people wearing black or dark-colored clothing were more likely to be burned. Other injuries.--Because of the combination of factors at the area near the center of the explosion, the casualty effects of blast are hard to single out. If it is remembered that even directly under the explosion, people were several hundred feet away from the air-burst, it will be easier to understand why true blast effects were relatively rare. Only toward the periphery of the affected zone was the blast effect lateral and likely to throw people violently against buildings, and at the periphery the intensity of the blast had fallen off sharply. Comparatively few instances were reported of arms or legs being torn from the body by flying debris. Another indication of the rarity of over-pressure is the scarcity of ruptured eardrums. Among

warm and then I saw everything flying around. My grandmother was hit on the head by a flying piece of roof and she was bleeding I became hysterical seeing my grandmother bleeding and we just ran around without knowing what to do. I was working at the office. I was talking to a friend at the window. I saw the whole city in a red flame, then I ducked. The pieces of the glass hit my back and face. My dress was torn off by the glass. Then I got up and ran to the mountain where the good shelter was. The two typical impulses were those: Aimless, even hysterical activity or flight from the city to shelter and food. The accentuated effect of these bombs came not only from the surprise and their crushing power, but also from the feeling of security among the inhabitants of the two cities before the attacks. Though Nagasaki had undergone five raids in the previous year, they had not been heavy, and Hiroshima had gone almost untouched until the morning of 6 August 1945. In both cities many people felt that they would be spared, and the various rumors in circulation supporting such feeling covered a wide range of wishful thoughts. There were so many Christians there, many Japanese-Americans came from Hiroshima, the city was a famous beauty spot--these and other even more fantastic reasons encouraged hopes. Other people felt vaguely that their city was being saved for "something big," however. Such a shattering event could not fail to have its impact on people's ways of thinking. Study of the patterns of belief about the war, before and after the bombing, show this change clearly. Prior to the dropping of the atomic bombs, the people of the two target cities appear to have had fewer misgivings about the war than people in other cities. An U.S.S.B.S. Morale division team interviewed a scientifically selected sample of almost 250 persons: 128 from Hiroshima and Nagasaki cities, and 120 from the immediately surrounding areas. The same standard questions were put to these people and similar groups in representative Japanese cities. Response to set questions indicate that among Japanese civilians prior to 1 July 1945: 59 percent in the Hiroshima-Nagasaki areas but 74 percent in the other urban areas entertained doubts about a Japanese Victory; 31 percent in Hiroshima-Nagasaki but 47 percent in other urban areas felt certain that victory for Japan was impossible; 12 percent in Hiroshima-Nagasaki but 34 percent in other urban areas had reached a point where they felt unable to continue the war. Further, 28 percent of the people of Japan as a whole said they had never reached a point where they felt they could not go on with the war, whereas 39 percent of the people in the Hiroshima-Nagasaki areas said they had never reached such a point. These figures clearly suggest that the will to resist had indeed been higher in the "atomic bomb cities" than in Japan as a whole. There is no doubt that the bomb was the most important influence among the people of these areas in making them think that defeat was inevitable. An additional 28 percent stated that after the atomic bomb was dropped they became convinced that victory for Japan was impossible. Almost one-fourth admitted that because of the bombing they felt personally unable to carry on. Forty percent testified to various degrees of defeatism induced by the atomic bomb. Significantly, certainty of defeat was much more prevalent at Hiroshima, where the area of devastation and the casualties were greater, than at Nagasaki. Typical comments of survivors were: If the enemy has this type of bomb, everyone is going to die, and we wish the war would hurry and finish. I did not expect that it was that powerful. I thought we have no defense against such a bomb. One of my children was killed by it, and I didn't care what happened after that. Other reactions were found. In view of their experiences, it is not remarkable that some of the survivors (nearly one-fifty) hated the Americans for using the bomb or expressed their anger in such terms as "cruel,"inhuman," and "barbarous." When I saw the injured and killed, I felt bitter against the enemy. After the atomic bomb exploded, I felt that now I must go to work in a munitions plant. My sons told me that they wouldn't forget the atomic bomb even when they grow up. They really despise the Americans for it, the people all say that if there are such things as ghosts, why don't they haunt the Americans? The reaction of hate and anger is not surprising, and it is likely that in fact it was a more extensive sentiment than the figures indicate, since unquestionably many respondents, out of fear or politeness, did not reveal their sentiments with complete candor. Despite this factor, the frequency of hostile sentiments seems low. Two percent of the respondents even volunteered the observation that they did not blame the United States for using the bomb. There is evidence that some hostility was turned against their own Government, either before or after the surrender, although only a few said they wondered why their nation could not have made the bomb. In many instances the reaction was simply one of resignation. A common comment was, "Since it was war, it was just shikata-ga-nai (Too bad)." Admiration for the bomb was more frequently expressed than anger. Over one-fourth of the people in the target cities and surrounding area said they were impressed by its power and by the scientific skill which underlay its discovery and production. Of greater significance are the reactions of the Japanese people as a whole. The two raids were all-Japan events and were intended so: The Allied Powers were trying to break the fighting spirit of the Japanese people and their leaders, not just of the residents of Hiroshima and Nagasaki. Virtually all the Japanese people had a chance to react to the bomb though the news had not reached to full spread at the time of the surrender. By the time the interviewing was done, only about 2 percent of the populations in rural areas and 1 percent in the cities had not heard of the bomb. The reactions found in the bombed cities appeared in the country as a whole--fear and terror, anger and hatred against the users, admiration for the scientific achievement--though in each case with less intensity. The effect of the bomb on attitudes toward the war in Japan as a whole was, however, much less marked than in the target cities. While 40 percent of the latter respondents reported defeatist feelings induced by the bomb, 28 percent of those in the islands as a whole attributed such reactions to the news of the bomb. There are at least three possible explanations of this difference. First, the level of confidence was quite low in Japan well before the time of the atomic bombing. Prior to 1 July 1945 doubts about a Japanese victory were felt by 74 percent of the population. By the same data 47 percent had become certain that a Japanese victory was impossible, and 34 percent felt that they could not go on with the war. Under these circumstances, the announcement of a new and devastating weapon was merely an addition to the already eloquent evidence of national weakness. Second, the reaction of those at some distance from the target cities seems to have been blunted by their direct experience with other sorts of misfortunes and hardships, the common phenomenon of psychological distance increasing with geographical distance. In Japan as a whole, for example, military losses and failures, such as those at Saipan, the Philippines, and Okinawa, were twice as important as this atomic bomb in inducing certainty of defeat. Other raids over Japan as a whole were more than three times as important in this respect. Consumer deprivations, such as food shortages and the attendant malnutrition, were also more important in bringing people to the point where they felt they could not go on with the war. Third, the lack of understanding of the meaning of the new weapon in areas away from the target undoubtedly limited its demoralizing effect. As distance from the target cities increased, the effectiveness of the bombs in causing certainty of defeat declined progressively: Percent of population certain of defeat because of atomic bomb: Group of cities: Hiroshima - Nagasaki 25% Cities nearest to target cities 23% Cities near to target cities 15% Cities far from target cities 8% Cities farthest from target cities 6% Only in the nearest group of cities, within 40 miles of Hiroshima or Nagasaki, was there a substantial effect on morale. Were the channels of mass communication as readily available to all the population as they are in the United States and had the use of the bomb received anything like the intensive coverage it had here, the effect on continued support of the war would probably have been greater. Something approaching such knowledge, of course, probably would have spread rather widely had the war continued many more weeks, whether sanctioned by the censors or spread by the ever-active rumor channels so common in the country. It is apparent that the effect of the atomic bombings on the confidence of the Japanese civilian population was remarkably localized. Outside of the target cities, it was subordinate to other demoralizing experiences. The effect which it did have was probably due largely to the number of casualties and the nature of the injuries received. These consequences were in part the result of surprise and the vulnerability of the raid defense system. Properly enforced warnings, precautions and an emergency care organization of the scale of the bomb's effects might have reduced casualties and, therefore, the effects on morale. Even in the target cities, it must be emphasized, the atomic bombs did not uniformly destroy the Japanese fighting spirit. Hiroshima and Nagasaki, when compared with other Japanese cities, were not more defeatist than the average. The bombs were tremendous personal catastrophes to the survivors, but neither time nor understanding of the revolutionary threat of the atomic bomb permitted them to see in these personal catastrophes a final blow to Japan's prospects for victory or negotiated peace. 3. The Japanese decision to surrender As early as the spring of 1944, a group of former prime ministers and others close to the Emperor had been making efforts toward bringing the war to an end. This group, including such men as Admiral Okada, Admiral Yonai, Prince Knonye, and Marquis Kido, had been influential in effecting Tojo's resignation and in making Admiral Suzuki Prime Minister after Koiso's fall. Even in the Suzuki cabinet, however, agreement was far from unanimous. The Navy Minister, Admiral Yonai, was sympathetic, but the War Minister, General Anami, usually represented the fight-to-the-end policy of the Army. In the Supreme War Guidance Council, a sort of inner cabinet, his adherence to that line was further assured by the participation of the Army and Navy chiefs of staff, so that on the peace issue this organization was evenly divided, with these three opposing the Prime Minister, Foreign Minister, and Navy Minister. At any time military (especially Army) dissatisfaction with the Cabinet might have eventuated at least in its fall and possibly in the "liquidation" of the antiwar members. Thus the problem facing the peace leaders in the Government was to bring about a surrender despite the hesitation of the War Minister and the opposition of the Army and Navy chiefs of staff. This had to be done, moreover, without precipitating counter measures by the Army which would eliminate the entire peace group. This was done ultimately by bringing the Emperor actively into the decision to accept the Potsdam terms. So long as the Emperor openly supported such a policy and could be presented to the country as doing so, the military, which had fostered and lived on the idea of complete obedience to the Emperor, could not effectively rebel. A preliminary step in this direction had been taken at the Imperial Conference on 26 June. At this meeting, the Emperor, taking an active part despite his custom to the contrary, stated that he desired the development of a plan to end the war as well as one to defend the home islands. This was followed by a renewal of earlier efforts to get the Soviet Union to intercede with the United States, which were effectively answered by the Potsdam Declaration on 26 July and the Russian declaration of war on 9 August. The atomic bombings considerably speeded up these political maneuverings within the government. This in itself was partly a morale effect, since there is ample evidence that members of the Cabinet were worried by the prospect of further atomic bombings, especially on the remains of Tokyo. The bombs did not convince the military that defense of the home islands was impossible, if their behavior in Government councils is adequate testimony. It did permit the Government to say, however, that no army without the weapon could possibly resist an enemy who had it, thus saving "face" for the Army leaders and not reflecting on the competence of Japanese industrialists or the valor of the Japanese soldier. In the Supreme War Guidance Council voting remained divided, with the war minister and the two chiefs of staff unwilling to accept surrender. There seems little doubt, however, that the bombing of Hiroshima and Nagasaki weakened their inclination to oppose the peace group. The peace effort culminated in an Imperial conference held on the night of 9 August and continued into the early hours of 10 August, for which the stage was set by the atomic bomb and the Russian war declaration. At this meeting the Emperor, again breaking his customary silence, stated specifically that he wanted acceptance of the Potsdam terms. A quip was current in high Government circles at this time that the atomic bomb was the real Kamikaze, since it saved Japan from further useless slaughter and destruction. It is apparent that in the atomic bomb the Japanese found the opportunity which they had been seeking, to break the existing deadlock within the Government over acceptance of the Potsdam terms. Page 3 of 6 Introduction: The atomic bomb dropped on Hiroshima and Nagasaki during World War II had devastating consequences that continue to impact the world to this day. The use of these powerful weapons changed the course of history, leading to significant political, social, and environmental consequences. In this presentation, we will explore the aftermath of the atomic bomb and its long-lasting effects on the world. Presentation: 1. Immediate Impact: – The immediate impact of the atomic bomb was the destruction of Hiroshima and Nagasaki, resulting in the deaths of over 200,000 people. – Thousands of survivors suffered from severe burns, radiation sickness, and other health issues, leading to long-term physical and psychological trauma. 2. Political Consequences: – The use of the atomic bomb by the United States against Japan brought an end to World War II but also sparked a nuclear arms race during the Cold War. – The development of nuclear weapons by other countries, such as the Soviet Union, China, and North Korea, led to increased tensions and the threat of nuclear war. 3. Social Consequences: – The survivors of the atomic bomb, known as hibakusha, faced discrimination and stigmatization in Japanese society. – The bombings also raised ethical questions about the use of nuclear weapons and the impact of war on civilian populations. 4. Environmental Consequences: – The atomic bomb explosions caused widespread destruction and contamination of the environment in Hiroshima and Nagasaki. – Radiation from the bombings continues to affect the health and well-being of residents in these cities, as well as future generations. 5. Legacy: – The atomic bomb has left a lasting legacy on the world, shaping international relations, arms control agreements, and the discourse on nuclear proliferation. – The memory of the bombings serves as a reminder of the horrors of war and the need for peace and diplomacy to prevent similar tragedies in the future. Conclusion: The consequences of the atomic bomb dropped on Hiroshima and Nagasaki were profound and far-reaching, impacting the world in political, social, and environmental ways. As we reflect on the aftermath of these events, it is crucial to remember the human cost of war and strive towards a future free from the threat of nuclear weapons. The Ultimate Guide to Understanding the Pros and Cons of the Atomic Bomb When it comes to discussing the consequences of the atomic bomb, it is crucial to understand both the pros and cons of such a powerful weapon. The atomic bomb, which was first used in warfare during World War II, had a significant impact on the world and continues to shape global politics and warfare to this day. Pros of the Atomic Bomb: Ending the War: One of the main arguments in favor of using the atomic bomb is that it helped bring about the end of World War II. The bombings of Hiroshima and Nagasaki led to the surrender of Japan, saving countless lives that would have been lost in a prolonged conflict. Deterrence: The development of nuclear weapons has arguably prevented major conflicts between nuclear-armed nations, as the devastating consequences of their use serve as a powerful deterrent. Technological Advancements: The research and development of the atomic bomb led to significant advancements in science and technology, particularly in the fields of nuclear physics and engineering. Cons of the Atomic Bomb: Humanitarian Concerns: The use of the atomic bomb resulted in the deaths of thousands of innocent civilians, causing widespread devastation and long-term health effects for survivors. Environmental Impact: The detonation of nuclear weapons has had lasting environmental consequences, including radiation contamination and long-term ecological damage. Proliferation Risks: The existence of nuclear weapons poses a constant threat of proliferation, with the potential for rogue states or terrorist groups to acquire and use such destructive weapons. Overall, the consequences of the atomic bomb are complex and far-reaching, with both positive and negative impacts that continue to shape our world today. By understanding the pros and cons of nuclear weapons, we can better grasp the ethical dilemmas and strategic considerations involved in their use. The Environmental Impact of the Atomic Bomb: Exploring the Long-term Effects on Ecosystems and Wildlife When the atomic bomb was dropped on Hiroshima and Nagasaki during World War II, the immediate devastation and loss of life were unprecedented. However, the long-term consequences of these bombings have also had a significant impact on the environment, particularly on ecosystems and wildlife. The explosion of the atomic bomb released large amounts of radioactive material into the atmosphere, contaminating the air, soil, and water in the surrounding areas. This radiation has had lasting effects on the ecosystems in these regions, affecting plants, animals, and microorganisms. One of the most immediate effects of the atomic bomb was the destruction of vegetation and wildlife in the blast zone. However, the radiation also had long-term consequences for the survivors, as it increased their risk of developing cancer and other health problems. In the years following the bombings, scientists have studied the impact of the atomic bomb on the environment, finding that the radiation has persisted in the soil and water, continuing to affect plants and animals in the area. This has led to changes in the ecosystem, as some species have been unable to survive in the contaminated environment. Overall, the environmental impact of the atomic bomb has been profound, with long-lasting effects on ecosystems and wildlife in the areas affected by the bombings. It serves as a stark reminder of the devastation that can be caused by nuclear weapons and the importance of protecting the environment from such catastrophic events. The Devastating Effects of a Nuclear War: A Comprehensive Analysis When the atomic bombs were dropped on Hiroshima and Nagasaki during World War II, the consequences were devastating. The immediate impact of the bombs was massive destruction and loss of life, with thousands of people killed instantly and many more dying from injuries and radiation exposure in the following days and weeks. The long-term effects of the atomic bombs were also catastrophic. The cities of Hiroshima and Nagasaki were left in ruins, with buildings destroyed and infrastructure severely damaged. The survivors of the bombings suffered from long-term health problems due to radiation exposure, including increased rates of cancer and other illnesses. Furthermore, the use of atomic bombs during World War II had a profound impact on the psychological and emotional well-being of the survivors and their descendants. The trauma of the bombings has been passed down through generations, leading to ongoing mental health issues and a sense of collective trauma in the affected communities. In conclusion, the consequences of the atomic bomb were far-reaching and continue to be felt to this day. The devastation caused by these weapons serves as a stark reminder of the horrors of nuclear war and the urgent need for global disarmament to prevent further tragedies from occurring. The Comprehensive Guide to Understanding the Impacts of the Atomic Bomb: A Quizlet Analysis In the aftermath of World War II, the atomic bomb was dropped on the cities of Hiroshima and Nagasaki in Japan, resulting in unprecedented destruction and loss of life. The consequences of this catastrophic event are still felt to this day, with lasting effects on the environment, human health, and international relations. The Comprehensive Guide to Understanding the Impacts of the Atomic Bomb: A Quizlet Analysis provides a detailed look at the impacts of the atomic bomb, examining the immediate and long-term effects on the affected populations. Through a series of quizzes and study materials, users can gain a deeper understanding of the far-reaching consequences of this devastating weapon. One of the key consequences of the atomic bomb was the widespread destruction of infrastructure and buildings in Hiroshima and Nagasaki. Entire neighborhoods were leveled, leaving thousands homeless and without access to basic necessities. The Quizlet Analysis delves into the extent of the damage caused by the bomb and its implications for the rebuilding efforts in the aftermath of the war. Another major impact of the atomic bomb was the high number of casualties, both immediate and long-term. Tens of thousands of people were killed in the initial blasts, with many more succumbing to radiation sickness in the weeks and months that followed. The Quizlet Analysis provides statistics and data on the human toll of the atomic bomb, shedding light on the scale of the tragedy. Furthermore, the Quizlet Analysis explores the political ramifications of the atomic bomb, including the arms race that followed in the decades after World War II. The use of nuclear weapons raised concerns about the potential for global annihilation and sparked a race to develop more powerful and destructive bombs. By examining the political fallout of the atomic bomb, users can gain insight into the complexities of international relations in the nuclear age. In conclusion, The Comprehensive Guide to Understanding the Impacts of the Atomic Bomb: A Quizlet Analysis offers a comprehensive overview of the consequences of one of the most devastating events in human history. By studying the impacts of the atomic bomb, users can gain a greater understanding of the far-reaching effects of nuclear warfare and the importance of preventing such catastrophic events in the future. In conclusion, the consequences of the atomic bomb were far-reaching and devastating. The immediate impact on the cities of Hiroshima and Nagasaki was catastrophic, resulting in tens of thousands of deaths and widespread destruction. The long-term effects of radiation exposure led to ongoing health issues for survivors and future generations. The use of the atomic bomb also set a dangerous precedent for the use of nuclear weapons in warfare and escalated tensions between nations during the Cold War. Ultimately, the atomic bomb serves as a stark reminder of the destructive power of human technology and the importance of working towards a world free from the threat of nuclear weapons. The consequences of the atomic bomb were devastating and far-reaching. The immediate impact was the loss of tens of thousands of lives in Hiroshima and Nagasaki, with many more suffering from long-term health effects from radiation exposure. The bombings also ushered in a new era of nuclear warfare, leading to the arms race and the threat of mutually assured destruction during the Cold War. The bombings also raised ethical questions about the use of such destructive weapons and their impact on innocent civilians. Ultimately, the atomic bomb changed the course of history and continues to shape global politics and warfare to this day. The atomic bombings of Hiroshima and Nagasaki killed over 214,000 people and demolished 70% of both cities' infrastructure. You'll find that the devastation was immediate and extensive – destroying 42 of 45 hospitals in Hiroshima alone. Survivors faced severe radiation sickness, with symptoms including bloody diarrhea, burns, and rapid deterioration. The collapse of medical facilities left victims without treatment, while contaminated areas complicated rescue efforts. The full scope of destruction extends far beyond these initial impacts. Key Takeaways The atomic bombs killed 214,000 people in total by the end of 1945, with 140,000 deaths in Hiroshima and 74,000 in Nagasaki. Massive infrastructure damage occurred, with 70% of Hiroshima's buildings destroyed and 42% of Nagasaki's urban terrain flattened. Healthcare systems collapsed as 90% of medical personnel were killed or injured, and 42 of 45 hospitals in Hiroshima were destroyed. Survivors experienced immediate radiation sickness symptoms including severe burns, bloody diarrhea, mucosal bleeding, and extreme dehydration. Total devastation occurred within 1-kilometer radius of each hypocenter, where intense heat instantly carbonized everything in its path. The Scale of Human Loss Two devastating atomic bombs forever changed the terrain of human suffering in World War II. The atomic bomb dropped on Hiroshima killed 140,000 people by the end of 1945, while Nagasaki's death toll reached 74,000. You'll find that these numbers only tell part of the story, as survivors faced dire circumstances that would haunt them for generations. The bombs' immediate impact left survivors battling severe health complications, including leukemia and various forms of cancer due to radiation exposure. What's particularly tragic is that when people needed medical care the most, 90% of Hiroshima's medical personnel were either dead or injured. With 42 out of 45 hospitals destroyed, you can imagine the impossible situation facing those who lived through the initial blast but required urgent medical attention. The Manhattan Project scientists who developed these weapons at Los Alamos would later grapple with the ethical implications of their creation. Hiroshima in the aftermath of the bombing Physical Destruction and Infrastructure Damage Beyond the staggering human toll, the atomic bombs released unparalleled physical devastation on both cities. The nuclear explosion in Hiroshima razed 70% of buildings across 6.7 square kilometers, while Nagasaki's bombing flattened 42% of its urban terrain. You can't comprehend the scale of destruction until you understand what was lost: Homes and neighborhoods were crushed into rubble, leaving thousands without shelter Hospitals and medical facilities collapsed when they were needed most Critical infrastructure like water systems, power grids, and roads ceased to function Emergency response capabilities were crippled as rescue facilities were destroyed The widespread destruction of buildings and infrastructure in both Hiroshima and Nagasaki created an environment where survival itself became a daily struggle, as basic services and emergency aid couldn't reach those who needed it most. The devastating power of these attacks came from two distinct weapons: a uranium-type bomb was used on Hiroshima while Nagasaki was destroyed by a plutonium variant. Nagasaki before and after the bombing, after the fires had burned out Medical Crisis and Healthcare Collapse When the atomic bombs devastated Hiroshima and Nagasaki, they also shattered the cities' medical response capabilities. The medical crisis was immediate and severe, with 90% of healthcare workers either dead or injured in Hiroshima. You can imagine the chaos as 42 of 45 hospitals became non-functional, leaving countless victims without access to essential care. The healthcare collapse was particularly devastating because 70% of survivors suffered multiple injuries, including severe burns that exceeded available treatment options. What made the situation even more tragic was that many aid workers who tried to help victims later died from acute radiation exposure. They didn't understand the dangers of radiation sickness at the time. With the local healthcare infrastructure in ruins and overwhelming casualties, many victims died simply because they couldn't access proper medical treatment. The situation demanded an unprecedented level of triage expertise to handle the massive influx of casualties with extremely limited resources. Radiation Sickness and Immediate Health Effects Although doctors had encountered various wartime injuries before, nothing could have prepared them for the horrific effects of radiation sickness that emerged after the atomic bombings. Japanese physicians documented severe cases of "genbaku-shou" and "genshi-byou," conditions caused by ionizing radiation exposure. You'd have seen devastating radiation effects, including skin problems, mucosal bleeding, and severe dehydration among survivors. The devastation in Japan was so extreme that even Japanese death ray research was abandoned as scientists witnessed the unprecedented destructive power of atomic weapons. The most heartbreaking aspects of acute radiation sickness included: Children suffering from bloody diarrhea and high fevers Elderly victims deteriorating rapidly with no available treatment Survivors watching their loved ones succumb to radiation-induced bone marrow damage Patients experiencing painful emaciation and anemia The younger survivors had better chances of recovery, but countless others died from these unparalleled medical complications that overwhelmed Japan's healthcare system. Hiroshima before and after bombing. Area around ground zero. 1,000 foot circles. Environmental Impact and Ground Zero The devastating medical effects of radiation exposure were only part of the atomic bombs' catastrophic legacy. When you look at ground zero in both Hiroshima and Nagasaki, you'll find that the nuclear bomb blasts completely transformed the urban environment. The explosions leveled 70% of all buildings, leaving nothing but charred ruins where bustling cities once stood. The destruction wasn't limited to buildings – critical infrastructure like hospitals and utilities were wiped out, making rescue efforts nearly impossible. Even after the initial blast, radiation contaminated the surrounding areas, making them dangerous for survivors and rescue workers who ventured into the ruins. You'd have seen total devastation within a 1-kilometer radius of each hypocenter, where the intense heat instantly carbonized everything in its path. Humanitarian Response Challenges Despite having thousands of victims who desperately needed medical care, Hiroshima and Nagasaki faced a catastrophic shortage of healthcare workers after the atomic bombs. The devastating loss of 90% of medical personnel left the cities' healthcare infrastructure in ruins, making it nearly impossible to provide emergency aid to mass casualties. The humanitarian response faced these overwhelming challenges: Hospitals couldn't function with most doctors and nurses either dead or wounded You'd find burn victims everywhere, but there weren't enough specialized facilities worldwide to treat them Brave aid workers lost their lives to radiation exposure while trying to help survivors Essential medical infrastructure was destroyed, leaving thousands without access to basic care The sheer scale of destruction created a novel humanitarian crisis that completely overwhelmed the remaining medical resources. Survivor Testimonies and First-Hand Accounts Survivors' harrowing accounts paint an unforgettable representation of August 1945, when nuclear devastation forever changed Hiroshima and Nagasaki. When you hear the testimonies of Hibakusha, you'll learn of the intense heat and blinding light that preceded unimaginable destruction. They describe shockwaves that instantly turned buildings and people to rubble, leaving survivors to search desperately through the wreckage for their loved ones. The aftermath brought severe radiation sickness, with overwhelmed hospitals struggling to treat countless victims suffering from burns and injuries. These first-hand accounts reveal the deep psychological trauma that haunted survivors, who faced lifelong health complications including cancer and leukemia. Their powerful testimonies serve as essential historical documentation and a sobering reminder of nuclear warfare's horrific human cost. Military and Strategic Consequences Beyond the human tragedy, military and strategic ramifications of the atomic bombings echoed throughout history. The atomic bombings of Hiroshima and Nagasaki fundamentally changed how you'll view warfare and international relations. After witnessing the devastating power of nuclear weapons, the world entered an era where the threat of atomic destruction loomed over every major conflict. You'll recognize how the bombings brought World War II to an abrupt end, sparing countless US military lives from a planned invasion. You'll understand how the US emerged as a dominant superpower, wielding unparalleled military influence. You'll see how these attacks sparked a desperate nuclear arms race between superpowers. You'll witness how Hiroshima and Nagasaki's destruction forever changed military strategy and diplomatic relations. Social and Community Breakdown When atomic bombs devastated Hiroshima and Nagasaki in 1945, they shattered not just buildings but entire social structures. The effects of these two atomic bombs dropped went far beyond physical destruction, as they eliminated the very systems meant to help survivors cope with disaster. You'll understand the depth of this breakdown when you consider that 90% of medical professionals in Hiroshima were either killed or injured, while 42 of 45 hospitals became non-functional. With 70% of buildings destroyed in Hiroshima and 6.7 sq km leveled in Nagasaki, basic community services collapsed. The city's ability to care for its wounded was virtually non-existent, especially with insufficient burn treatment facilities worldwide. Years later, these catastrophic weapons' impact on social infrastructure would become a powerful argument for the elimination of nuclear weapons. Initial International Reactions The atomic bombings of Hiroshima and Nagasaki sparked immediate global outrage, with nations worldwide condemning America's decision to use nuclear weapons. While President Harry Truman and the Allied powers defended the Manhattan Project's outcome, you'll find that international criticism was swift and severe. The Soviet Union labeled it a deliberate massacre, while Britain's leadership expressed deep discomfort with the devastating attacks. The Vatican's Pope Pius XII denounced the bombings as humanity's darkest technological accomplishment. India's leaders called for immediate nuclear disarmament. Global medical institutions, including Nagasaki Medical College hospital, documented the horrific effects. The Hiroshima Peace Memorial Museum became a powerful symbol of the international movement for the Prohibition of Nuclear Weapons. The atomic bombings of Hiroshima and Nagasaki produced effects in Japan and around the world that changed the course of history. Tens of thousands of people were killed in the initial explosions (an estimated 70,000 in Hiroshima and 40,000 in Nagasaki), and many more later succumbed to burns, injuries, and radiation poisoning. On August 10, 1945, one day after the bombing of Nagasaki, the Japanese government issued a statement agreeing to accept the Allied surrender terms that had been dictated in the Potsdam Declaration. The United States gained wide-reaching influence in Japan during its occupation and as a result of its installation of the Supreme Commander for the Allied Powers, a title held by the American general Douglas MacArthur. The U.S. occupation of Japan had long and lasting effects on daily life in Japan as well as on Japan's economy, military, and government.The atomic bombings of Hiroshima and Nagasaki also caused global effects such as the Cold War and the proliferation of nuclear weapons around the world. The Cold War was a rivalry that saw the world's two remaining superpowers after World War II—the United States and the Soviet Union, as well as their respective allies—fight for political, economic, and nuclear superiority. Today, more countries possess nuclear weapons, but such weapons have not been used in warfare since the bombings of Hiroshima and Nagasaki.

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