



## Possible reasons for changing mortality rates

In the decades of the 1850s, 60s, 70s and 80s the mortality rate especially for children and young adults in Dunedin and elsewhere was extremely high.

The death rate for the year 1863 – 4 was 35.3 per thousand. More than half of these were children under 5 years of age. There were 13 funerals in two days in May 1864 in a population of 20,000.

By 1874 the death rate was 24.8 per thousand for the complete year. Although it was a significant drop compared to 1863-4 that rate was to more than halve by the end of the next century.

- Why was the death rate so high?
- What were the causes of early mortality?
- What were the changes that occurred that impacted on high mortality rates in Victorian and Edwardian New Zealand?

The following resources track a range of possible changes over time using Dunedin as a case study. This is presented as a timeline to assist students with starter ideas for specific inquiries into life and living in Victorian and Edwardian New Zealand.

Similar issues were occurring in other New Zealand and Australian towns. Where inventions or discoveries from overseas are considered to have an impact on life style in New Zealand then they are included in red. Where government legislation may have had an impact, it is noted in blue.

# TIMELINE OF CHANGE

# Timeline illustrating conditions & changes that impacted on high mortality rates in Victorian and Edwardian New Zealand

## Decade = 1850's Dunedin

	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	
No Taps	Domestic water collected from various streams including MacLaggan St, London St, Regent Road, N.E.V, Leith & Kaikorai streams. Water use estimated at 30 gallons per person daily.									First report on water supply for town	
No flush toilets	Many families had privies or closets. Many emptied straight into streams or cesspools. "Nightsoil" was emptied into cesspools, open drains or channels or handy swamps. Open-air toileting. Flax bushes were used as toilets.										
No pulling the sink/bath plug!	No showers. Bathing irregular and probably included swimming. Used water tipped into gardens streetgutters or cesspools.						Dr William Purdie gave a public lecture on the benefits of clean skin in 1857.		Bardsley & Son soap making factory est.		
No Wheelie Bins	Waste not cleaned up. Dead animals such as rats and bullocks frequently left to decay on the streets.										
No lights	Candles used for domestic lighting			Modern kerosene lamp invented.	Petroleum drilling begun & kerosene lamp in popular use.						
No heat pumps	Heating from open fires. Wood felled with axes and often carried long distances.										
No microwaves	Cooking over open fires. Hanging and tripod pots used. (The coal range had been invented before 1800 and some would have been installed in NZ homes at this time. The coal range was to prove very popular and many were in continued use well into the 1950s).										
No refrigerators	Food storage difficult. 1857 Slaughterhouse established in Kaikorai Valley. 1859 complaint several butchers continued to slaughter in the town area leaving offal to lie & putrify.										
No domestic Fire alarms										Fire Brigade & bell offered by local insurance company.	
Limited hospital services	First hospital granted funding by Governor Grey & opened Oct 1851. 3 storey wooden building located in Octagon				Hospital had coped well with small community.						14 patients in 1859
No vaccines or antibiotics				Hypodermic syringe 1st used to administer drugs							
No hard roads	Roads were dirt tracks becoming "canals of liquid mud and clay" in wet weather.										
No cars, trucks or buses	People usually walked to destinations. High boots were needed for the mud. Horses were ridden. Bullock carts, drays & boats for cartage.			Steamer "Queen" anchored ½m from Dunedin jetty. Caused a revolution in transport for Dunedin.							
No separate bedroom! Overcrowding	Many first settlers began life with a one-roomed "Whare" made of mai mai or raupo. Problems with rats and flea infestations & children bitten. Barracks on foreshore for new arrivals.			Some settlers built with clay bricks and with wattle and daub construction techniques. Warmer and snugger homes but small dwellings.			Small single or two roomed Weatherboard houses often made of green wood that warped and shrank letting in the cold. Wooden roof tiles that let in rain water. Calico stretched across windows instead of glass. Families of 6 or 7 children plus were common.				

# Timeline illustrating conditions & changes that impacted on high mortality rates in Victorian and Edwardian New Zealand

## Decade = 1860's Dunedin

	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
No taps	Public water pump installed in High Street utilises spring.	Not uncommon to see one person drawing water from a stinking creek while another person used it as a drain.			Rainwater collected in tanks was contaminated by large amounts of dust that also settled on roofs	Dr Hocken suggests water filtering by stretching calico across the tank inlet. He also suggested boiling drinking water.		Ross Creek water supply for city only. 40gals per head per day.	Ross creek unable to supply high suburbs – eg Roslyn	
No toilets	Shocking sanitary conditions especially with population influx for goldfields. Many complaints. Privies (referred to as “nuisances”) were simply holes from 2–15ft deep dug in the ground with a closet built on top. Most could not afford the services of a “Nightman.” Wells and streams contaminated by seepage from cesspools. Many cesspools were built under houses. Animals free to roam also contaminated water supplies. Horses were watered in a creek in Upper Union street. Goats and ducks spoiled wells in Filleul St. Rattray St Sewer built in 1862. Two public toilets for men erected in 1862.					Commission to inquire into sanitation. Estimated that of 20,000 tons of excrement a year nearly all of it lay in & around buildings.		Nothing done. Board confined efforts to persuade people to use earth closets instead of cesspools. Not much success.		
No pulling the sink/bath plug!	Bedroom washbasins the norm. Tin baths brought out and placed in front of the fire. These were filled by buckets & emptied into street drains or gutters.							Several privately owned bathing establishments were started.		
No Wheelie Bins	All sorts of waste drained via open ditches into the town's marshes and swamps.	In 1861 a tip to receive dead animals, rubbish, dung & sewerage was created.	Complaints forced the closure of 1 <sup>st</sup> tip within months. Other tip sites were arranged. The service continued but not everyone could afford to use it eg Fish market offal thrown out on mudflats.		ODT reported piles of fish & offal 2ft deep had collected at the mouth of the Rattray St sewer.					
No lights	Candles and increasingly kerosene lamps used for domestic lighting.		Gas & Coke Co install 10 street lamps.	First gas lamps lit. 100 installed	50 more gas lamps installed	Some private customers but gas very expensive. A lot of complaints about pricing.				
No heat pumps										
No microwaves	Gas stoves were in common use after 1860 in the US.									
No refrigerators			An observer noted that because meat was expensive many were obliged to eat diseased or rotting meat.	By 1864 - Presence of animal pleuro-pneumonia resulted in quarantining of animals imported from Australia for slaughter. 1864-Arcade hawker prosecuted & fined £5 for “exposing for sale” 2 casks of unsound salted beef. 1864 on Many prosecutions, brought against meat hawkers selling diseased and rotting meat by the market inspector, followed.		Meat was frequently hung for display outside a butchers shop exposing it to street dust, flies and the sun's heat. Until 1867 pigs could be kept in the town. The pigsty in Stafford St smelt so bad that the “inspector of nuisances” reported he was sick for an hour after visiting it.		Benevolent Insttit medical report stated diarrhoea very prevalent in children & attributed to adjacent slaughter yard.	Slaughter yards required a license. Animal owners needed to have an animal inspected before slaughtering.	

# Decade = 1860's Dunedin

Pop = 5,850

Pop = 15,790

Pop = 12,277

	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869
No domestic Fire alarms	Fire Station built on Beach reserve.	Volunteer Fire Brigade operational. Witness building fire.	Water tanks installed in Princess St for brigade.	New lookout tower built. Major fire destroys several businesses	2 major fires in Feb and June in business areas	24 Jan -12 buildings lost including original First Church. Feb & Mar fires.	4 Mar - Fire destroyed 28 close packed premises & 2 hotels.	Apr-Princess St fire swept both sides of the street - Moray Place to Octagon		
Limited hospital services	Hospital heating minimal and wards	Oct 1861 24 patients. inadequate ventilation wards overcrowded.	98 patients	173 patients. Those considered insane placing pressure on hospital & gaol. 22 "lunatics" moved to building near Town Belt.	Great Exhibition Building King St becomes new hospital. Despite being built on a swamp 104 male patients & 24 female patients were transferred in Aug 1866.		In early years many patients were accident admissions. People with infectious diseases were not admitted although Typhoid patients were admitted as they were not considered infectious. Many deaths from septicaemia and gangrene. Smell of hospital wards terrible. Doctors did not wash hands before surgery.			
No vaccines	Note: Edward Jenner discovered an effective means of vaccination for smallpox in 1796	Semmelweiss demonstrates that puerperal fever (an infection which killed many mothers & babies) was caused by poor hand hygiene practices.		Arrival of immigrant ship <i>Victory</i> with small pox on board. Establishment of a Quarantine Station in Otago Harbour on two small islands. 1863 Vaccination Act appointed public vaccinators and made it compulsory for every child under 6 mths to be vaccinated for small pox*.						
No hard roads		Goldfields soldiers employed in road making.		Winter mud and summer dust made roads very difficult to use. Horse and bullock dung added to problems. Surface looked like "thick dirty porridge" after rain or spraying to keep summer dust down.		Gravel obtained from Water of Leith used to thinly cover some busy roads.		Form of cobble-stone or small wooden blocks used at busy intersections.		
No cars, trucks or buses		Cabs - Fare paying, horse drawn carriages begin public transport operation in Dunedin.								Council regulates fares for cabs
No separate bedroom! Overcrowding	First stone building erected in Dunedin. Kilgour's Whinstone Store.	The Gold Rush. Thousands are living in tents on any spare space they can find.	First "inspector of nuisances" appointed - 1862. People fined for not keeping a clean premises. Landlords could be charged with keeping their tenements in a filthy state. Lodging houses were also inspected & proprietor prosecuted for keeping the bedding in a filthy state.	A number of brick business premises built in Princess St.		By mid 1860s a lot of wooden slum accommodation. Overcrowding problems. Evidence of fires. New St Kilda swampy building sections advertised with health-benefits.				



# Decade = 1870's Dunedin

Pop = 14,857

Pop = 18,499

	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879
No domestic Fire alarms					Major fire at Guthrie & Larnach's timber yard.	Traction for engine for fire brigade provided by paying the first person who got a horse to the station after the fire bell was rung.			2 Horses kept at Station each night. Sep -Major blaze in S.E. quadrant of Octagon 12 people killed.	
Limited hospital services	In the late 1860s & early 1870's Joseph Lister developed the idea of sterile hands, tools and conditions in theatres and hospitals using chemicals such as carbolic acid		Some of Lister's ideas trialled		Medical school opened for training of doctors.	1875 Families with Scarlet fever were quarantined. Special constables appointed to prevent anyone leaving the house & paid for by the families. 1875- Fever hospital built in town belt to isolate scarlet fever victims.			Fever hospital in Town Belt closed. Surgery in a transition state between the days of septic surgery and the development of the antiseptic surgery of Lister.	
No vaccines or antibiotics		The impracticalities of compulsory vaccination recognised. New legislation made vaccination for small pox no longer compulsory.	New buildings were erected in 1872-74 on Quarantine Island to ease accommodation problems. 1872 Public Heath Act Compulsory infant smallpox vaccinations reintroduced.	Feb - Arrival of <i>Charlotte Gladstone</i> into quarantine with Typhoid Fever aboard.  Oct-Arrival of <i>Lady Jocelyn</i> with Diphtheria and Scarlet Fever on board	Apr – Virulent typhoid fever epidemic in Cromwell. July - Arrival of <i>Mongol</i> into Quarantine with measles & Scarlet fever onboard. Oct/Nov – severe measles epidemic.	Nov – Epidemic of Scarlet Fever.  Scarlet fever death rate 7 per 10,000. Double the rate for NZ.	1876 Legislation requiring doctors to notify infectious diseases.	Apr Arrival of <i>Gloucester</i> into quarantine with Small Pox among the Chinese passengers on board Mar- Scarlet Fever and measles Dunedin.		
No hard roads	Roads remained gravelled although there was considerable improvement in the gradient & surface condition of roads during this period. Mud was under somewhat better control. During dry periods dust clouds continued to be a problem.									
No cars, trucks or buses		Gourley's omnibuses compete with the horse-drawn cabs.	Dec - Railway line Dunedin to Port Chalmers opened.		Jul -Southern Railway line to Abbotsford opened	Railway workshops at Hillside opened.	Railway to Forbury Park. 70 cabs plying main route	Railway to Anderson's Bay operational.	Sept – ChCh to Dunedin railway opened.	Proudfoots' steam drawn tram trialed. Two deaths as a result.
No separate bedroom! Overcrowding				First Church completed Some handsome buildings erected in City. Also some wretched slums. Dunedin's first medical officer recommended that people be prevented from building houses of less than three rooms to allow for "ventilation"			Knox Church Exchange Customs House built.			

# Timeline illustrating conditions & changes that impacted on high mortality rates in Victorian and Edwardian New Zealand

## Decade = 1880's Dunedin

	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
No taps		Silverstream water reticulation system opened			A second water main installed to provide water to higher suburbs.		Drought causes water shortages in city.			
No flush toilets →	1880 S.H.Miriams reported transporting 748 tanks a month. Nightmen collected it in a specially constructed wooden tank on wheels. When full it was brought to the railway siding and lifted by crane off its wheels onto a railway truck. 3 trucks to a wagon. Trucks were taken along the main south line to a siding. The siding lessee could decide how it was used. At first it was spread on adjacent land. Then it was dried and used as artificial manure.				Public toilet for women provided by the new department stores eg DIC who provided a "ladies dressing room".		Caversham & Sth Dunedin Boroughs collaborate in building a drain  Sewer outlets continue to outfall into the harbour.		By the end of the 1880s an estimated 750 closets were still in use. Sewers were draining other liquid household wastes and storm water. Sewers did not necessarily mean that people installed water closets or flush toilets in their homes. Uptake was slow.	
No pulling the sink/bath plug!					1884 St Clair Salt water baths opened. Pelichet Bay baths also opened.					
No Wheelie bins	By early 1880s the council contract for removing dust & house refuse involved the employment of five horses and drays daily.									
No lights			Ross & Glendenning Woollen Mills are electrified.				Less gas used in Dunedin than other centres. Immediate price reductions for cooking and heating.			
No heat pumps							Hire purchase of gas stoves & other domestic equipment introduced.			
No microwaves										
No refrigerators ←			15 February 1882, the "Dunedin" sailed from Port Chalmers with 1 <sup>st</sup> frozen meat shipment to leave NZ. Burnside freezing works established 1882.	Fresh meat comes from privately owned slaughter yards. Conditions of hygiene deplorable.		First attempt to have a regulated abattoir fails due to vested interests by suburban boroughs.			Milk borne outbreak of typhoid fever. In ChCh.	→

# Decade = 1880's Dunedin

Pop = 45,518

	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
No domestic Fire alarms	Fire in tram sheds. Many damaged cars. Fire brigade moves-south side town hall.	Fire brigade bell tower installed in town hall tower.	Three children killed in the Kitchener fire in Cumberland St.			Fire brigade reorganised – senior employees now paid professionals not volunteers				
Limited hospital services	Listerian principles were increasingly adopted by Doctors who urged improved hygiene & sanitary conditions both within and around the hospital. Increasing pressure to improve conditions, buildings, floor, ceiling & wall surfaces, ventilation, sunlight, drains etc.					Asylum opened at Seacliff for psychiatric patients.				
No vaccines or antibiotics			Robert Koch discovers bacteria responsible for tuberculosis	Koch discovers bacteria responsible for Cholera	Koch formulates rules for controlling a cholera epidemic					Dr MacDonald exhorts Council to filter water, erect an abattoir, & adopt stringent laws regarding roaming dogs.
No hard roads										
No cars, trucks or buses	More miles of tramline per head of population than any other city in the world. 32 cars operating. 7 miles of single track. 3½ m of double track	First cable car begins operations.		Mornington tramway operating. Tramways sold to Council.	Steam engines withdrawn after another fatal accident. Roslyn cable car begins operations.	Penny-farthing bicycles appeared during the 1880s  The development of the trams also enabled the suburban areas to develop. People moved out of the area within the belt to healthier and less crowded areas of the city. In 1886 the pop of Dunedin was 23, 243. The total pop including the suburban areas was 45, 518.				
No separate bedroom! Overcrowding	Town Hall opened.					Census -1886 Of 4336 dwellings 864 were made of brick, stone or concrete. The rest were wood. About half the houses were of 4 rooms or less. 455 were two roomed houses. 95 were single roomed houses. The average number of persons per house was 5. 36. Overcrowding was serious.				Dunedin Exhibition in Jervois street.

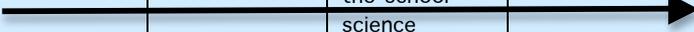
# Timeline illustrating conditions & changes that impacted on high mortality rates in Victorian and Edwardian New Zealand

## Decade = 1890's Dunedin

	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899
No taps										
No toilets	Harbour Board expresses concerns about state of pollution in harbour again.		Extension of St Andrews St sewer.		Unanimous agreement that improved sewerage system necessary. Drainage committee set up. Shelved	Sewer outlets continue to outfall into the harbour. Newspapers complained about the excrement that continued to build up along the foreshore. Otago harbour earned the title "Stinkapool"  Nightsoil also deposited on Ocean Beach domain at this time.				By 1900 many of Dunedin's grander homes had installed inside water closets connected to the city sewerage system. Many more modest homes still continued with an outside privy attached to the house or at the bottom of the garden. New homes being connected as they are built. Many older remain unconnected,
No pulling the sink/bath plug						By 1895 8 laundries listed in Dunedin. Householders boiled clothes in a copper near the back of the house. Mondays were usually washdays.				Wealthier residents employed domestic servants for duties such as washing clothes.
No Wheelie Bins										
No lights										
No heat pumps										
No microwaves	Electric stoves first made an appearance in the 1890s overseas.									
No refrigerators	City Council General committee considers connection between typhoid fever and milk supply from Blair's dairy in NEV. Sale of this milk banned.  All city & suburban dairies inspected.				Councils General Committee finally decide the population needs access to healthy meat. No meat to be sold unless killed at a public abattoir.	Competition for the design of a slaughter yard to accommodate 180 head of cattle, 2000 sheep & 75 pigs a week.	Building of City Abattoir delayed for financial reasons. Report on slaughterhouses finds 6 are dilapidated & unsanitary & likely to contaminate meat. An inspector of slaughterhouses appointed and takes up position in Jan 1896. Dr Ogston (lecturer public health) states specimens from slaughtered carcasses indicated hydatids, tuberculosis, and various other diseases evident. Dairy owners request inspection of shops selling milk.		City abattoir built at Burnside and opened.  Dairy owners complain about carriers carting milk and refuse in their milk carts.	

# Decade = 1890's Dunedin

Pop = 47,280

	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	
No domestic Fire alarms								Horses stalled day and night at the fire station.			
Limited hospital services	The death of two of Dr Batchelor's patients initiated the hospital inquiry. The commissioner upheld the conclusion that insanitary conditions had caused the deterioration & death of patients.		Improvements in sanitation methods, hygiene, & improved methods of antiseptics and asepsis continue. Antiseptics is the application of substances to living tissue/skin to reduce the possibility of infection, sepsis, or putrefaction (gangrene). Asepsis is the reduction or elimination of contaminants (such as bacteria, viruses, fungi, and parasites) from entering the operative field.							Health Instruction and personal hygiene was included in the school science curriculum.	
No vaccines or antibiotics	Typhoid fever outbreak.			NZ wide measles outbreak.	Anti-toxin serum for diphtheria developed by Emil Von Behring					The local medical association asked for tuberculosis leaflets to be distributed & urged action on cleaning up Dunedin water.	
	The only available responses to epidemics were isolation of infected cases, school disinfection and closure. Schoolrooms were disinfected by fumigation ie with burning sulphur or washing down with carbolic acid.										
No hard roads											
No cars, trucks or buses										Tram lines now cover 15 miles of city & suburbs. Ocean beach railway established.	
No separate bedroom! Overcrowding						Council began to respond to concerns about quality of housing. Inspectors sometime issued notices for repair or demolition.					

# Timeline illustrating conditions & changes that impacted on high mortality rates in Victorian and Edwardian New Zealand

## Decade = 1900's Dunedin

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
No taps							Water shortages to hill suburbs experienced			
No toilets	Nightsoil taken on a punt to the lower harbour in the hope that tides would wash it out to sea. Sewers at MacLaggan St, Rattray St., St Andrews & Frederick Sts & Manor Place to be extended across the mudflat.				Sewer outlets continue to outfall into the harbour.			Sewerage outfall at Lawyers Head started. Intention to intercept sewerage flow toward harbour and divert to sea.		
No pulling the sink/bath plug!	13 laundries in operation. 7 of these run by Chinese.	By 1903 wealthier houses that had internal water closets also had a bath. Houses with earth closets rarely had a bath.								
No Wheelie Bins										
No lights				Violent explosion at Gas plant.			Private Gas co bought out by council in 1907.	Waipori electric power supply station completed. 2x1000kw units produced. Transport via the Halfway bust substation	Lack of demand for electrical supply from households and businesses. People unfamiliar with safety and reliability of electricity. Door to door petitioning to seek increased custom.	
No heat pumps										
No microwaves										
No refrigerators	Most houses contained a meat safe. This was a well aired fly-free box built on an outside wall of the house where it was cool. Some houses were built with a cool room – a cool well aired place to store preserved food.			Meat safes and cool rooms were to be an important method of domestic cool storage for the next 50 plus years →						

# Timeline illustrating conditions & changes that impacted on high mortality rates in Victorian and Edwardian New Zealand

## Decade = 1900's Dunedin

Pop = 56,792

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
No domestic Fire alarms										
Limited hospital services				Temporary isolation hospital at old Caversham Barracks for Scarlet Fever & measles epidemics.			Plunkett established for mothers and babies.		Pelichet Bay hospital built. Temporary tent "Camp" followed by permanent hospital.	
No vaccines or antibiotics	1900- Outbreak of plague in Sydney-303 plague cases and 103 deaths resulted. Threat of plague entering Dunedin via port. Widespread extermination of rats. 1901- Von Behring wins Noble Prize for anti toxin serum for Diphtheria.									
No hard roads									Successful experiments with Neuchatel asphalt on Rattray St.	Covering roads with permanent materials started.
No cars, trucks or buses	The first motorcar appeared in Dunedin. Highgate electric trams begin to operate. First Electric tram in NZ. Rattray St Cable car loses control. Man killed.	Horse trams to continue in meantime. Success of 1 <sup>st</sup> Electric tram becomes reason to electrify the city.		Steam plant opened to operate electric trams. Regular electric tram services underway.		Bicycles now numerous	Electric trams running over most routes			
No separate bedroom! Overcrowding	Plaque anxieties prompt council into more diligent sanitary inspections of property.		Slums still abound Walker St, McLaggan St, and alleys around King and Cumberland Sts.							

# Timeline illustrating conditions & changes that impacted on high mortality rates in Victorian and Edwardian New Zealand

## Decade = 1910's Dunedin

	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
No taps						 World War 1	Drought brings spectre of water shortages			In 1920 a pumping station was opened at Powder Creek increasing Dunedin's water supply capacity.
No toilets			Termination of nightsoil removal.							
No pulling the sink/bath plug!			Land agents giving evidence at The 1912 Cost of Living Inquiry claim few people would rent a place without hot and cold water installed, a bath, drains to a sewer & electric light and gas.							
No Wheelie bins										
No lights	Outram & Mosgiel electricity supply from Outram substation	Additional electric generators installed		6,000kw electricity produced from Waipori	Electricity generation making a profit					
No heat pumps										In 1925 there were 31 electric ranges & 40 water heaters in the corporations district.
No microwaves										
No refrigerators							Kelvinator and Servel models were among some two dozen home refrigerators introduced to the U.S. market in 1916			It was not until the 1940s that domestic frozen food storage became widely used by consumers.



## Resources

### BOOKS

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- Wood, P. J. (2005). *Dirt: Filth and Decay in a New World Arcadia*. Auckland, N.Z. : Auckland University Press.

