



Lesson 1. What is 'risk?' Risk can be defined as a situation involving exposure to a danger, or the possibility that something unpleasant will happen and someone or something which may have a negative impact on a person.

Risks in the local Formby area:

- ✓ Traffic risks - congested roads
- ✓ Human risks - crimes, anti-social behaviour
- ✓ Environmental risks - high tides, quicksand, stormy weather, coastal flooding



Image showing coastal flooding at the Lifeboat Road Formby beach exit point.

Health Risks	Human Risk	Environmental Risks
Ebola (disease)	Forest fires/wildfires	Forest fires/wildfires
Malnutrition (people following a poor diet, which has a lack of nutrients).	Ebola (disease)	Hurricane
Forest fires/wildfires	Malnutrition (people following a poor diet, which has a lack of nutrients).	War
Hurricane	Hurricane	Nuclear disasters
War	War	Meteor shower/impact
Nuclear disasters	Nuclear disasters	
	Meteor shower/impact	

**Knowledge Check:** can you give reasons for why examples of risks in this table are examples of health, human and environmental risk? Think about what may be impacted by them.

The most serious risks are those which impact a large number of people and a large area. Ebola, Hurricanes and War are examples. These risks impact a large scale area, possibly impacting regions of countries, countries and groups of countries.

The least serious risks are those which impact a smaller number of people and a smaller area. They are also risks that are less likely to happen, such as a meteor shower.



Lesson 1: Challenge Task Investigating social risks across Sefton. Social risks are those relating to crime - risks which are created by people.



The number of reported anti-social behaviour, burglary, and robbery crimes are unevenly distributed across north Sefton, varying between Thornton and Bootle.

In general, Bootle has a higher amount of these recorded crimes. This is due to an increase in the population towards north Liverpool, which means that the number of these crimes that will be reported to the Police is likely to be higher.

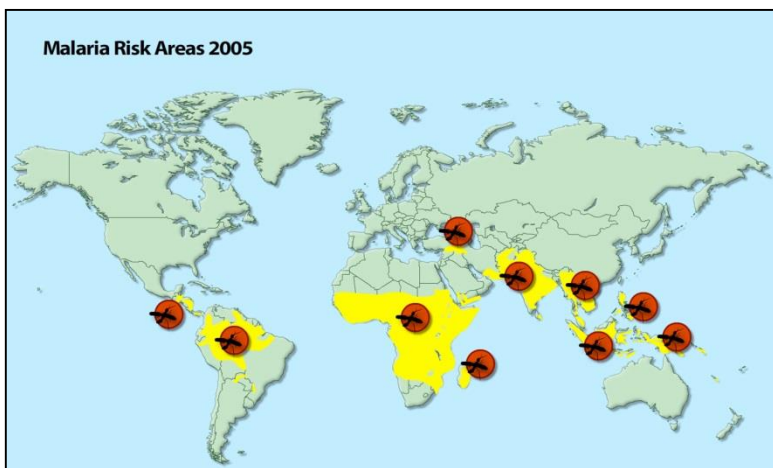
On the contrary, there are a fewer number of crimes reported in Thornton. This is because the population is smaller in the Thornton area, so therefore there is likely to be a reduced number of reported crimes.

Education, rates of employment and other social factors such as rates of deprivation, could also be reasons to explain the differences in the crimes.



**Making Links!** What is the link between social crime rates and life expectancy across Sefton?

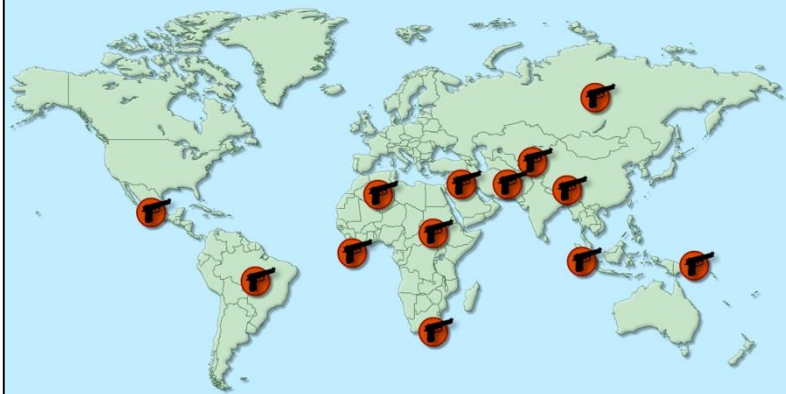
Lesson 2: Investigating Global Risk. Can you describe and explain the distribution of the main global risks?



- ✓ **General:** Malaria is unevenly distributed across the globe.
- ✓ **Lowest:** The lowest frequency is on the continents of North America, Europe and North Asia.
- ✓ **Anomaly:** northern region of the Middle East
- ✓ **Highest:** Sub-Saharan African countries and southern Africa.



Over 5 gun deaths per 100,000 population in 2005



- ✓ **General:** unevenly distributed.
- ✓ **Lowest:** The lowest frequency is on the continents of North America and Europe
- ✓ **Anomaly:** The USA does not have any recorded gun deaths.
- ✓ **Highest:** Sub-Saharan African countries and the Middle East.

- ✓ **General:** unevenly distributed.
- ✓ **Lowest:** The lowest frequency is on the coasts of North America and Australia.
- ✓ **Anomaly:** Along the coast of Morocco, Algeria and Tunisia.
- ✓ **Highest:** Central and SE Asia: Bangladesh, India and China.

High mortality risk from flood, cyclone and landslide hazards



There are a range of natural and human socio-economic factors which interact to influence the location of the three types of risk shown in the three maps. The development (wealth) of the country and the effectiveness of the government of each country to manage the risk/s is crucial to the frequency of the risk and where the risk is found.

Lesson 3: Mitigating Geography field trip risks - YOU are the teacher here, completing a risk assessment!

Students should be able to identify the risks in the natural environment and suggest how the risks can be mitigated. **Mitigation** means how the risks can be reduced by controlling them, so the risk can be eventually removed.



## Geography Fieldtrip River Study: Risk Assessment Table

Risk Category	Risk	Consequences if not mitigated	How to mitigate
Poor/extreme weather	1) Being/getting cold. 2) Persistent rain.	Hypothermia - cold fingers and toes. Make people feel ill and cold.	Have warm drinks, thin layers of clothes - like a fleece. Waterproof jacket with a hood, wellies.
The river & river water	1) Could be swept away. 2) Falling over/tripping into the water.	Banging your head on the river bed/bank and becoming unconscious and eventually drowning.	Only go into the river if it is below knee-height. Stay on the flat river bank and do not enter the river if it is turbulent/too deep.
The landscape and ground	1) Slipping on uneven ground. 2) Vegetation may cause an allergy.	You could fall and be injured. Some people could have an allergic reaction to vegetation which poses a threat as an allergen.	Be careful whilst walking. Make sure you are wearing supportive footwear. If a person suffers from an allergy, ensure anti-histamines / epi-pen medication is with them.
Working in the river	1) Slip and falling.	Banging your head on the river bed/bank and becoming unconscious and eventually drowning.	Only go into the river if it is below knee-height.
Transportation to Wales	1) Injury due to a road accident.	Injury/death.	Wear seatbelt and behave well.

This completed table outlines the thinking process a teacher has to complete to ensure a fieldtrip to a risky upland environment has been thoroughly risk assessed. Governments and agencies (such as FEMA in the USA), also complete similar risk activities to ensure natural and human risks are mitigated thoroughly, helping to save lives and reduce casualties from natural disasters and hazards.



Lesson 4: Investigating the risks associated with tropical revolving storms - hurricanes and how they can be reduced.



The following states are all impacted by hurricanes:

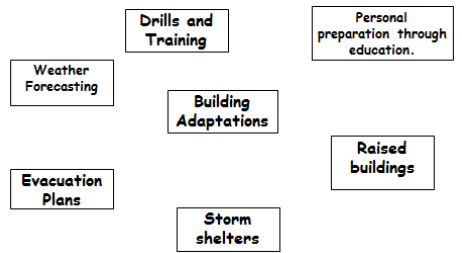
- Texas
- Louisiana
- Mississippi
- Alabama
- Florida
- Georgia
- South Carolina
- North Carolina
- Virginia
- Maryland
- Delaware
- New Jersey
- Pennsylvania
- New York
- Connecticut
- Rhode Island
- Massachusetts
- New Hampshire
- Maine

Hurricane Katrina Case Study, August 2005.

Risks associated with Hurricane Katrina were: coastal flooding, buildings damaged, houses destroyed, fresh water supplies contaminated and broken, miles of congested car evacuation routes, powerlines damaged and industry and business disrupted for months.

Infrastructure: transport networks (road, rail, sea and air) all disrupted or destroyed. Can also include gas, water and electricity networks needed for a society to operate.

Ways to reduce the risks of hurricanes:



All of these strategies help to reduce the risk from hurricanes, because they strengthen and adapt the building to withstand the high winds and flooding, help to inform the residents of the areas the hurricane is going to impact and raises awareness and education with people so they know what to do to plan and prepare for an approaching hurricane.

**Knowledge Check:** You should be able to provide an explanation as to why each of these strategies helps to reduce the impact of hurricanes.



## Lesson 5: Classifying the risks and intensity of an earthquake.

**Mercalli Scale**

- I. Felt by almost no one.
- II. Felt by very few people.
- III. Tremor noticed by many, but they often do not realize it is an earthquake.
- IV. Felt indoors by many. Feels like a truck has struck the building.
- V. Felt by nearly everyone; many people awakened. Swaying trees and poles may be observed.
- VI. Felt by all; many people run outdoors. Furniture moved, slight damage occurs.
- VII. Everyone runs outdoors. Poorly built structures considerably damaged; slight damage elsewhere.
- VIII. Specially designed structures damaged slightly, others collapse.
- IX. All buildings considerably damaged, many shift off foundations. Noticeable cracks in ground.
- X. Many structures destroyed. Ground is badly cracked.
- XI. Almost all structures fall. Bridges wrecked. Very wide cracks in ground.
- XII. Total destruction. Waves seen on ground surfaces, objects are tumbled and tossed.



The Mercalli Scale: A twelve-point scale for expressing the local intensity of an earthquake, ranging from I (not noticeable) to 12 (total destruction).

It is based on the physical damage that can be observed after an earthquake has happened.

**Positives** of the scale:

- ✓ Intensity measured based on actual observed damage, not interpreted or assumed damage.
- ✓ Allows differences in damage to be captured over a street or from one area of a neighbourhood to another.

**Negatives** of the scale:

- ✓ Actual intensity of the energy is not recorded - like with the Richter Scale.
- ✓ It is subjective - the scale is based on an individual's interpretation (thoughts and feelings). Therefore the scale is not very scientific.

## Lesson 6: Who is most at risk?



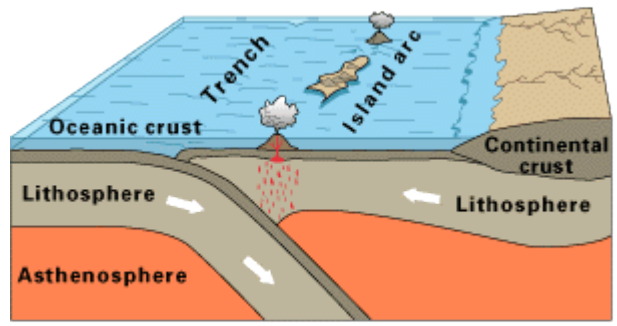
People who live in poor, developing nations or Low Income Countries (LICs) are at more risk than people who live in developed, richer High Income Countries (HICs). However, the **nature and type of risk** can also affect who is impacted. For example, tropical storms can impact people regardless of the development of their country, as the **magnitude and severity of the storm event** can impact those who are well-off and those who live in poverty. Additionally, **how the hazard is managed and mitigated by governments and their agencies** can also influence who is affected. The **different hazard type** can also have an impact. Those at risk changes dependent upon the hazard type, from drought and heatwaves, to forest fires and earthquakes. This is due to the **differing factors of population density, wealth, awareness of the hazard and technology having an influence on the risk posed to people.**



Lesson 7: What are the Volcanic Hazards of the Eruption of Montserrat and how can they be Mitigated?



Montserrat is an overseas British Territory, located in the Caribbean islands, in the Lesser Antilles chain. It is volcanically active as it lies at a destructive plate margin.



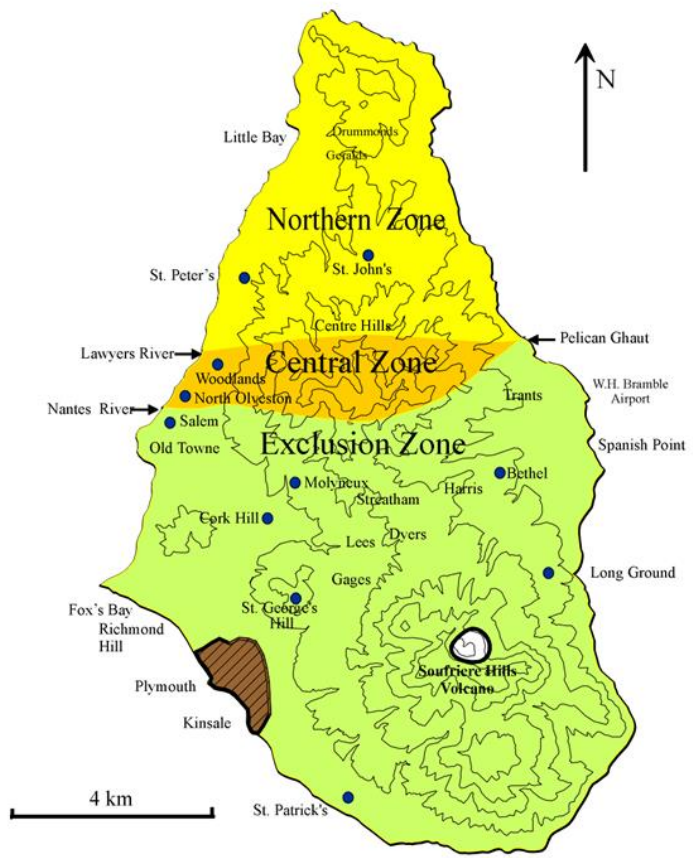
Oceanic-oceanic convergence

Pyroclastic Flow	A superheated cloud of gas, ash and particles.
Volcanic Bombs	Red-hot rocks and large pebbles ejected.
Lava Flow	Gloopy, honey-like flowing molten rock.
Ash and Rock Fall	Rock and soil are pulverised and rain down.
Mudflows (lahars)	Water mixes with the soil and flows downhill.

During the ongoing eruption of Montserrat, between 1995-1997, there were five main types of volcanic hazards which impacted the south of the island.



### Montserrat Volcano Risk Map September 1997



Based on the immediate location of the five volcanic hazards, the government of the island divided the island into three zones:

**Exclusion Zone:** Too dangerous for anyone to enter. Immediate evacuation.

**Central Zone:** Elderly people and children must be evacuated. Other residents must be ready to leave at short notice.

**Northern Zone:** This area is considered to be safe. People evacuated from other zones will move here.

The map opposite shows that the whole island was zoned according to the hazard risk type.

- Exclusion Zone No admittance except for scientific monitoring and National Security Matters
- Central Zone Residential area only, all resident on heightened state of alert. All resident to have rapid means of exit 24 hours per day. Hard hat area all residents to have hard hats and dust masks.
- Northern Zone Area with significantly lower risk, suitable for residential and commercial occupation



## Montserrat Risk Assessment and Hazard Planning Exercise

### Risk Assessment and Hazard Planning Exercise.

Event	Decision A	Decision B	Decision C	Points awarded
1. The dome on the eastern side of Chances Peak is growing larger.	Evacuate all settlements on the eastern side of the volcano.	Set up road blocks at Long Ground to monitor the situation.	Send a helicopter to circle the crater and report back.	
2. Lava, ash and rocks pour down the Tar River valley, producing huge clouds of steam.	Set up an evacuation zone south of the main road between Plymouth and the airport at.	Offer a television and radio warning to all residents living within 2 km of the crater.	Watch and monitor the volcano carefully from a safe distance.	
3. Most vegetation in the south side of the island is dead, buried beneath hot ash.	Monitor the situation and avoid panic.	Evacuate Plymouth immediately	Wait for a report from the helicopter.	
4. An ash cloud blown westwards, has buried Plymouth beneath centimeters of ash.	Evacuate all settlements 1 km north of the road between Plymouth and the airport.	Broadcast a television and radio warning to all residents living north of the main road from Plymouth to the airport.	Await further news updates. You do not want to cause concern without reason.	
5. Pyroclastic flows along Paradise <del>about</del> have reached Harris's village.	Evacuate all settlements up to 3 km north of the road between Plymouth and the airport.	Issue a "stay indoors" alert to all settlements north of the road between Plymouth and the airport.	Do nothing and avoid moving the people unnecessarily.	
6. Ash and pebbles fell on Salem causing minor injuries.	Evacuate all settlements on the island.	Await accurate information from the helicopter.	Issue a warning to stay indoors until further notice.	
7. There is a danger of mudflows along many of the valleys around the Soufriere Hills if it rains.	Ask the helicopter for regular weather reports.	Send a search party to find anyone left behind.	Monitor events to avoid making a rash decision.	
8. A lava flow passed within meters of the school in Cork Hill.	Do nothing.	Monitor the progress of the lava flow from a safe distance.	Send a search party to check for casualties.	
9. The airport has been closed until further notice.	Warn all incoming air traffic to find an alternative landing site.	Evacuate the airport staff and customers waiting for flights.	Do nothing at this stage it is not a big emergency.	
10. A temporary port has been opened at Little Bay near Davy Hill, for people to leave the island.	Move all evacuated residents to Little Bay immediately.	Make a plan for residents to move to Little Bay avoiding congestion.	Wait for help to arrive. No reason to rush your decisions.	

The aim of this activity is to use your knowledge of the volcanic hazard types and the places they have impacted on the island to think through your own risk assessment.

For each of the events, a decision (A-C) should be selected.

Points are then awarded based on the outcome.

Points for hazard and risk exercise

	A	B	C
1	10	5	0
2	10	5	0
3	5	10	0
4	10	5	0
5	10	5	0
6	0	10	5
7	10	0	5
8	0	5	10
9	5	10	0
10	0	10	5



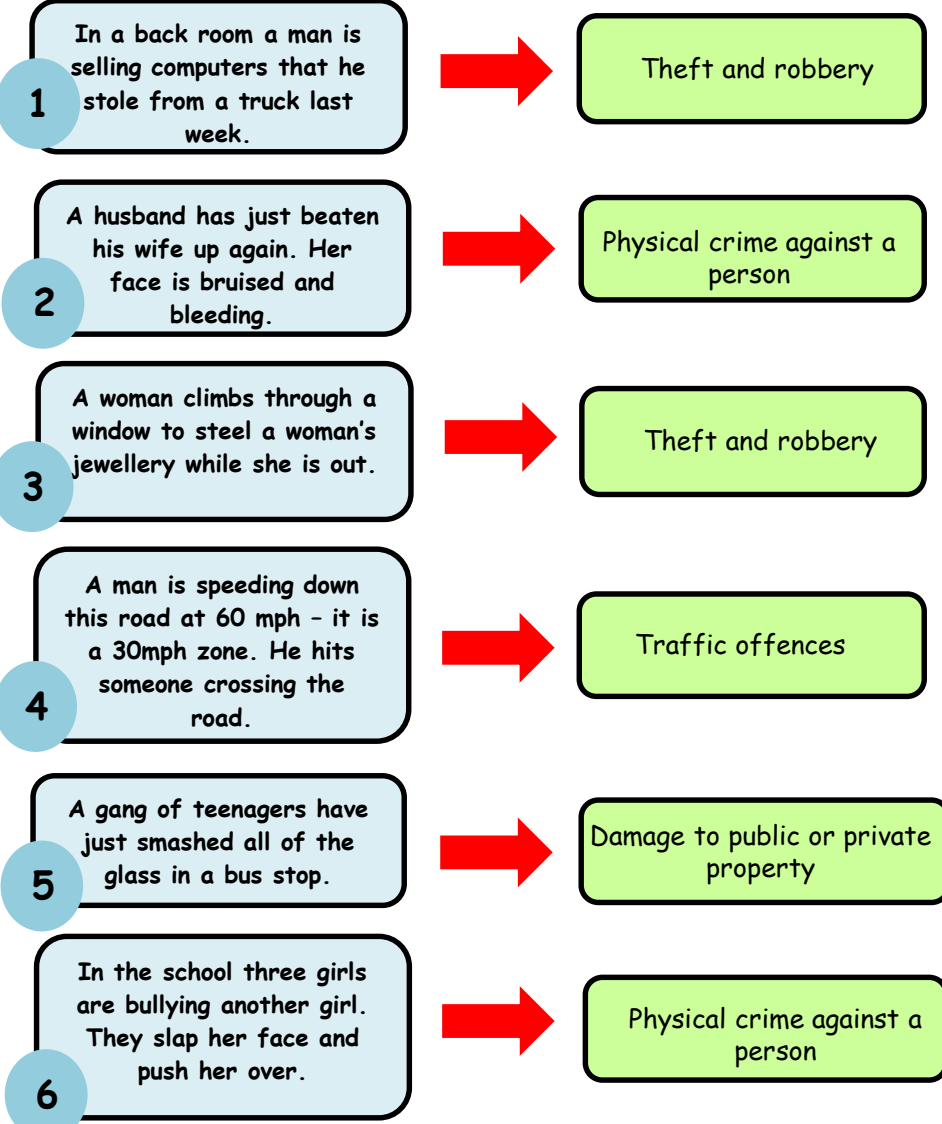
**Assessment link: you will need to use these skills in your Unit Assessment.**

**Purpose of the Risk Assessment Exercise:**

- The Montserrat Volcano Observatory was set up to study the volcanic activity after the eruptions of 1995.
- The learning tasks you completed are what were actually completed during the eruptions in the summer of 1995.
- The island of Montserrat was the first volcanic island to be hazard mapped.
- The aim is to Predict, Plan and Prevent risks to the people of the island.
- Governments call this The 3Ps approach.



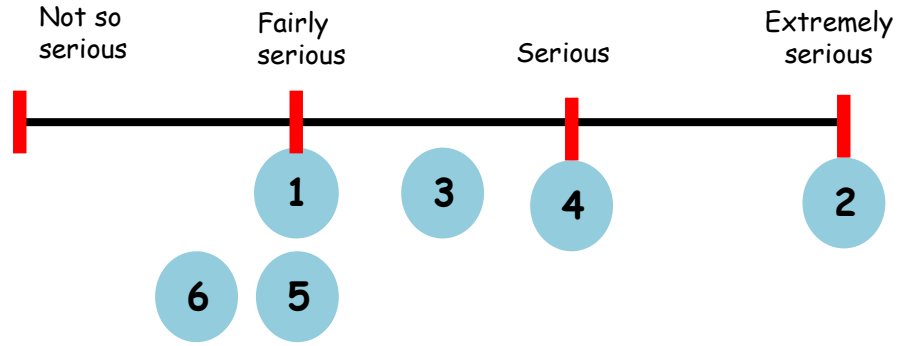
Lesson 8: What are the Different Types of Social Crimes and how Serious is Their Impact on Communities?



Assessment link: you will need to use these skills in your Unit Assessment.

For this lesson, you must be able to categorise a range of urban social crimes and then be able to rate each crime on a scale of seriousness.

Finally, you should be able to give reasons for the number you gave each crime on the scale of seriousness, justifying your choice.



Crime 4 has been placed at the serious stage on the scale, as speeding is a crime and could have a very serious impact on people. For example, a young child could be ran over if a person was to speed in a residential area, like Freshfield Road in Formby. It could injure the child or even cause death, as well as impacting the driver.



Lesson 9: What is the Distribution of Burglary like Across Sefton and what are the Reasons for the Distribution?

*Using your completed choropleth map of Sefton, you should be able to interpret it and provide answers to the following questions.*

1. Name a few of the wards with the highest burglary incidents in Sefton.

The Sefton wards which have the highest crime rates are Derby (with 37), Litherland (with 25), Dukes (with 25) and Norwood (with 21). These are reported as instances of burglaries reported in August 2018.

2. Name a few of the wards with the lowest burglary incidents in Sefton.

The Sefton wards with the lowest number of reported burglary rates are: Kew (with 9), Ainsdale (with 6), Harrington (with 2) and Victoria (with 12). These values are reported as instances of burglaries reported in August 2018.

These answers to questions 1 and 2 above are examples of good answers because they use data and refer to the units of the data, helping to give accurate responses.

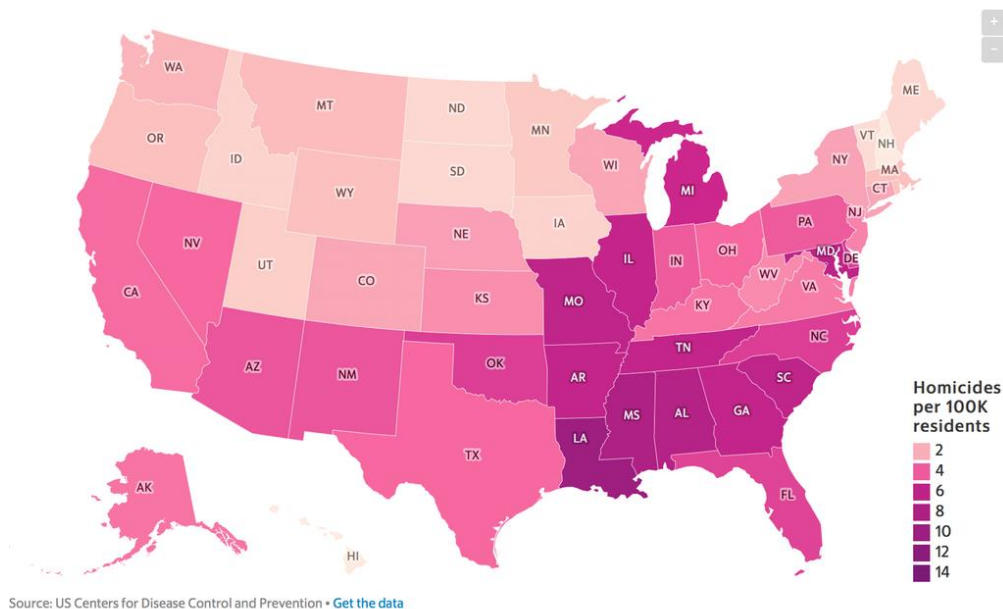
3. Describe the general pattern of burglary across Sefton (use the terms north, south, east and west).

The overall pattern of crime across the wards of Sefton is uneven. In the northern wards, the reported instances of burglary are quite high, such as Dukes (with 25) and Norwood (with 21). The number of reported burglaries tends to be lower in the mid-wards, such as Harrington (with 2) and Manor (with 0). The instances of burglaries reported in August 2018 then increases in the south of Sefton, where Sefton borders the City of Liverpool, as evidenced by Derby (with 37) and Linacre (with 20).

4. Could you suggest any **reasons** for the pattern on your map? (E.g. why do you think the highest burglary happens in certain wards?). Think about population density and distribution and socio-economic reasons such as employment and unemployment, as well as household income.



GUN HOMICIDES PER 100,000 RESIDENTS BY U.S. STATE, 2007-2016



### Advantages of Using Choropleth Maps 😊

- ✓ They provide a visual representation of detailed, often numeric data which allows changes over distance to be seen clearly.
- ✓ Changes in the variable being represented can be seen over direction and distance. This means changes can be described east to west and north to south, using compass directions.
- ✓ They are easy to plot and complete.

### Disadvantages of Using Choropleth Maps 😞

- ✓ They can be hard to interpret if someone is suffering from colour-blindness.
- ✓ They assume that there are direct changes from region to region, as a border is crossed the variable changes instantly. This is not the case, as the variable changes over a more localised small scale area.
- ✓ It also assumes that large regions or areas have the same overall variable score. For example, the State of Texas on the map above (TX), does not have the same uniform homicide value. It is a huge State with much variation.



## Risky World Topic Glossary

Keyword	Definition
risk	A situation involving exposure to a danger, or the possibility that something unpleasant will happen and someone or something which may have a negative impact on a person.
natural hazard	Naturally occurring hazards such as earthquakes, tsunamis, tropical revolving storms and volcanic eruptions.
mitigation	A strategy or method to reduce/limit the risk posed to humans.
Mercalli scale	A twelve-point scale for expressing the local intensity of an earthquake, ranging from I (not noticeable) to 12 (total destruction).
pyroclastic flow	A superheated cloud of volcanic dust, ash and gas which travels at high speed and vaporises anything its path, emitted from a volcano during an eruption.
social impacts	Damage which causes injuries and fatalities to the local population of where the tsunami hits.
economic impacts	Financially costly damage to industry, trade and infrastructure/transport networks.
environmental impacts	Damage to the natural landscape and ecosystems - including an impact on species of animals and plants.
infrastructure	Facilities and installations that help a government or community run, including roads, schools, phone lines, sewage treatment plants and power generation.