

From: Allen, Keeley (Health)
Sent: Monday, 10 January 2022 17:00
To: Pingault, Nevada (Health); Marmor, Alexandra (Health)
Subject: Draft donuts report
Attachments: Draft Mrs Kim's Donuts Outbreak Summary report - 20220110.docx

Hi ladies,

I've put together a first draft of the donut outbreak report. I was hoping you would both be able to have a review and provide feedback before it is sent onto EH to complete their components. I recognise Alex that you may not have time before going on leave so there is no pressure.

The report is attached and it is saved [here](#).

Thank you in advance for your help.

Best,
Keeley

Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.





Health Protection Service

Howard Florey Centenary House, 25 Mulvey Street, Holder ACT 2611
 Locked Bag 5005, Weston Creek ACT 2611
 Phone: (02) 6205 1700 Fax: (02) 6205 1705
 Website: www.health.act.gov.au
 ABN: 88 407 290 295

OUTBREAK SUMMARY

Outbreak ID:	20210403		
Name of Institution:	Mrs Kim's Donuts		
Address:	9/15 Tench Street, Kingston ACT 2604		
Contact Person:		Phone:	
Email:		Fax:	
Date Notified:	25/11/2021	Date outbreak investigation commenced:	25/11/2021

Summary

- An outbreak of gastrointestinal illness affecting 215 patrons of a donut shop in late November 2021 was investigated.
- Findings from epidemiological, clinical and environmental health investigations suggest *norovirus* infection, following ingestion of a donut from the food business between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive.
- No source of infection was identified; however, the suspected source is an unwell [REDACTED] and a lapse in safe food handling procedures.

Initial notifications

Health Protection Services received several food poisoning complaints over a four-day period that related to this food poisoning outbreak. These complaints include direct reports that named the business as the complainant's primary suspected source of illness, and indirect reports that initially implicated another food business where the complainant also ate from Mrs Kim's Donuts.

Direct notifications

- On Thursday 25 November, Health Protection Services (HPS) at ACT Health Directorate were made aware of a food poisoning complaint associated with Mrs Kim's Donuts. The proprietor notified HPS of this complaint. The complaint was regarding gastroenteritis symptoms in 11 people following consumption of donuts.
- The Disease Surveillance team interviewed each family group on the afternoon of Thursday 25 November 2021.
 - 11 people across four households reported illness. All households included at least one sick person.
 - 100% of the ill people ate a donut from Mrs Kim's Donuts purchased on 20 November 2021.
 - The median time from eating the donut to symptom onset in this initial group was 29 hours (range 24-48 hours) and median duration of illness for those who had illness resolved by time of interview was 48 hours (range 42-54 hours).

- The most common symptoms reported in this initial group were diarrhoea, abdominal pain, and vomiting. No individuals reported blood in the stool.
- The households had not seen or eaten with each other in the week prior. The fourth household was also in quarantine at the time of exposure and illness.
- Separately, ACT Health Environmental Health customer service line received two separate food poisoning complaints on Thursday 25 November 2021 from patrons who ate food from Mrs Kim's Donuts on 20 November 2021 and 21 November 2021. These complainants and their contacts were interviewed by the Disease Surveillance team on Thursday 25 November 2021.

Indirect notifications

- Health Protection Services also investigated three separate food poisoning complaints initially implicated other businesses where the complainants also ate from Mrs Kim's Donuts
- ACT Health Environmental Health customer service line was contacted for a food poisoning complaint on Tuesday 23 November for a restaurant in Phillip. The complainant shared the meal among their household of 4 and 2 visiting family members.
 - All 6 family members reported becoming ill after eating from the restaurant on 20 November 2021, however no single food source was identified.
 - The Disease Surveillance Team reinterviewed the family on 29 November 2021 to confirm if any of the 6 had eaten a product from Mrs Kim's Donuts
 - The family confirmed they had eaten from Mrs Kim's Donuts 1.5 days before symptom onset.
- On Friday 26 November, a team doctor for [REDACTED] contact the Disease Surveillance team to report multiple sick team members following consumption of milkshakes from [REDACTED] Braddon at a team gathering.
 - The team doctor was reinterviewed on Monday 29 November 2021 and confirmed the team had also eaten donuts from Mrs Kim's Donuts.
 - All 19 team members were surveyed on Monday 29 November 2021.
- On Tuesday 23 November, a complaint was received regarding two people becoming unwell following [REDACTED] Kingston. In their 3-day food history completed on Thursday 25 November, the complaint and their partner also mentioned eating from Mrs Kim's Donuts the meal prior to [REDACTED]

Hypothesis

- The symptoms, duration and incubation period were suggestive of a viral infection, particularly norovirus.
- While all ill patrons reported eating a donut, no one flavour was identified at initial interview, suggesting that the source may have been due to a common ingredient, food handler and/or environmental contamination.

Case definition

A **case** in this outbreak is defined as:

A person who reported gastrointestinal symptoms (diarrhoea and/or vomiting) to ACT Health following the consumption of a donut in the Australian Capital Territory from Saturday 20 November 2021 to Wednesday 24 November 2021 inclusive.

A **non-case – mild illness** in this outbreak is defined as:

A person who reported at least one of fever, abdominal pain, body aches/pains, headaches, and nausea – but did not report diarrhoea and/or vomiting – after consuming a donut purchased in the Australian Capital Territory from Friday 19 November 2021 to Saturday 27 November 2021 inclusive

A **non-case** in this outbreak was defined as:

A person who did not reported gastrointestinal symptoms (diarrhoea and/or vomiting) after consuming a donut purchased in the Australian Capital Territory from Friday 19 November 2021 to Saturday 27 November 2021 inclusive.

Individuals were excluded for the overall analysis if:

- Time from consumption to illness onset was less than 6 hours, and no chronic gastrointestinal health conditions were evident,
- No food products were consumed from the food business,
- Food products were consumed earlier than Saturday 20 November 2021, or
- Food products were consumed later than Wednesday 24 November 2021

Epidemiological Investigation

- The investigation was led by the Keeley Allen (MAE Scholar), with assistance from Felicity Greenville (Public Health Nurse), Dr Nevada Pingault (Surveillance Manager), Alexandra Marmor (Surveillance Coordinator), Fotis Sgouros (Vaccine Data Entry Officer), Raleigh Evans (Vaccine Delivery Officer), and Algreg Gomez (MAE Scholar).
- Active case finding was not able to be undertaken for this outbreak:
 - Most orders are purchased by walk in customers.
 - Check In CBR data is strictly for the purpose of COVID-19 contact tracing.
 - Orders lists and records were requested from the food business. The food business declined keeping such records.
 - Orders lists from [REDACTED] were discussed, however this was not progressed after discussions with the Deputy CHO's office.
 - No media releases or news items were released.
- This investigation relied on passive case finding and snowballing to identify contacts who shared meals with a complainant.
- Food poisoning complaints were diverted to the Disease Surveillance Team on Friday 26 December 2021 for an initial triage interview to confirm if the complaint related to this outbreak. If the complaint was regarding another food business, the complainant was directed back to the Environmental Health team.
- Case interviews were conducted using three methods:
 - Phone interviews – all complainants interviewed on 25 November, on 26 November, who only provided a landline phone number, or required a translator had interviews conducted over the phone. Interview data was held in a REDCap instrument.
 - REDCap survey – a REDCap survey was implemented on Monday 29 November for complaints received from that date onwards. Complainants and their contacts who shared the meal were emailed or texted the link to a self-administered survey. A reminder was sent to complainants if a response was not received one week after the first email from the Disease Surveillance team
 - REDCap cohort surveys – separate REDCap instruments were set up for defined cohorts that were identified from initial complaints. These cohorts included four work related functions, and one professional sports team. The cohort surveys were self-administered and mirrored

the general REDCap survey. One point of contact from each cohort was used to distribute the surveys within their organisation.

- Interviews/surveys were conducted for ill and well patrons.
- The interviews/surveys adapted the Environmental Health Food Poisoning Complaint questionnaire to collect information on symptoms, illness onset, illness duration, severity, foods eaten (including specific donut flavours), date purchased, dates eaten, and contact details of anyone who ate the product with the individuals. No fields were mandatory
- 3-day food history questions were dropped from Monday 29 January due to the volume of complaints received, and the increasing certainty of the food business as the source of infection.
- Interviews/surveys were conducted from Thursday 25 November 2021 to Friday 10 December 2021.
- The menu for 20 November to 24 November was requested from the food business. The food business stated they did not keep records of what flavours were sold on what days, and did not have a set menu, nor any patterns in what flavours were made on what days.
 - Menu items were identified from a menu posted on [REDACTED] and from initial case interviews.
- Donut flavours were categorised by filling type
 - Unfilled
 - Caramel/jam/Nutella filling – these were pre-bought fillings with no additional preparation by the food business
 - Cream/custard filling – these fillings were made on site by the food business.
- It was determined that a full analytical study would not be used for the whole outbreak as identifying the total number of patrons and obtaining enough controls was not feasible through passive case finding.
 - A case-control study was conducted for the largest cohort within the outbreak, the [REDACTED]
- A line-list of respondents was created from the REDCap exports and analysed in Microsoft Excel and R.

Commented [AK(1): I have included the ORs anyway, let me know if they should stay or go.

Results

- The total number of patrons in the study period was not known.
- The Disease Surveillance Team interviewed or surveyed 301 individuals
- 215 respondents met the case definition (71% of respondents)
- A further 16 cases reported a milder illness without vomiting and/or diarrhoea and did not meet the case definition.
- The sex and age group profiles of the ill and not-ill groups are shown in Table 1.

Table 1: Age and sex of ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

	Ill	Not ill	Total
Total	215	86	301
Sex			
<i>Male</i>	103	38	141
<i>Female</i>	112	47	159
<i>Missing</i>	0	1	1

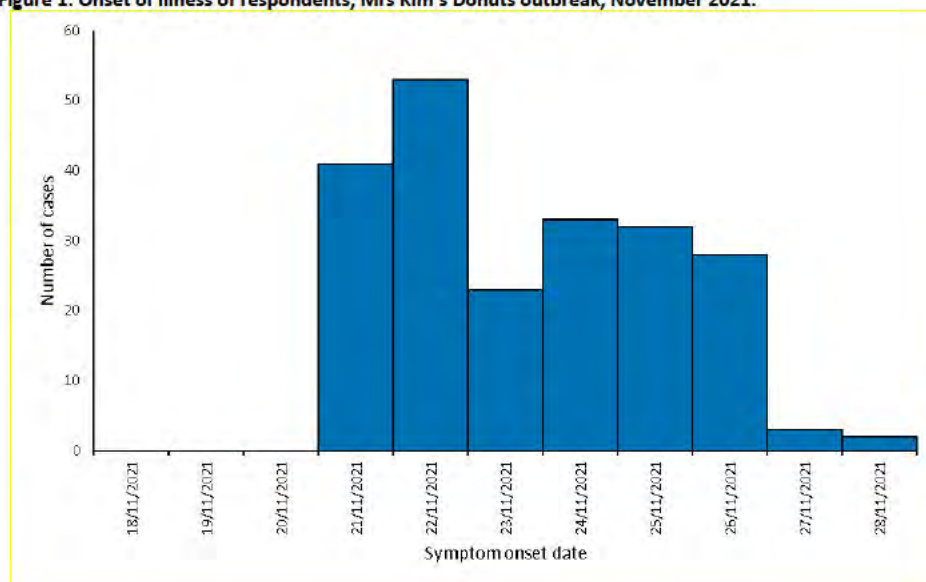
Age			
0-19 years	15	8	23
20-39 years	130	48	178
40-59 years	42	16	58
60 years +	16	2	18
Missing	12	12	24

- All patrons (ill and not ill) ate a donut from the food premises bought between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive. Most patrons purchased a donut on 20 November (a Saturday, the busiest trading day for the food premises) or 24 November (a Wednesday with three work functions) (Table 2).

Table 2: Date of purchase by ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

Date of purchase	Ill	Not ill	Total
20/11/2021	84	13	97
21/11/2021	39	12	51
22/11/2021	14	2	16
23/11/2021	29	8	37
24/11/2021	48	50	98
Missing	1	1	2
Total	215	86	301

- Most cases became unwell in the late hours of 21 November 2021 or the late hours of 22 November 2021 (Figure 1 overleaf).
- Most respondents (195) purchased and ate as an individual purchase or in a small social group. 106 respondents ate as part of one of five defined cohorts (Table 3 overleaf).

Figure 1: Onset of illness of respondents, Mrs Kim's Donuts outbreak, November 2021.**Table 3: Nested cohorts and attack rates (where known), Mrs Kim's Donuts outbreak, November 2021.**

Cohort	Date of event	Attack rate		Total respondents	AR – respondents
		Ill	Not ill		
[Redacted]	20/11/2021	8	11	19	42.1%
[Redacted]	23/11/2021	11	4	15	72.7%
[Redacted]	23/11/2021	3	1	4	75%
[Redacted]	24/11/2021	5	4	9	55.6%
[Redacted]	24/11/2021	27	32	59	45.8%

Note: [Redacted] had 19 attendees, and [Redacted] had 140 attendees. The number of attendees for all other events is not known

- The main features of illness associated with this outbreak were:
 - median incubation time was 33.5 hours (range 6.27 – 138 hours, IQR 28.6-42.4 hours).
 - median duration of symptoms was 48 hours (range 3 – 174.5 hours, IQR 29.3-72 hours)
 - diarrhoea, vomiting and/or abdominal pain were the most common symptoms reported
 - one case was hospitalised with their illness. This case had a short incubation period (6.26 hours) and was included after a review of their discharge summary, and history of gastric sleeve surgery.
 - this outbreak includes 8 likely cases of secondary transmission among household members. These 8 cases reported an incubation period of greater than 96 hours from eating a donut, and prior to their onset, at least one other member of their household ill was after consuming a donut.
- The odds that a person was ill after eating a filled donut compared to a person who did not eat a filled donut was not statistically significant (OR: 2.00, 95% CI: 0.98-4.04).
 - The odds that a person who ate a cream/custard filled donut was ill was 2.48 times higher (95% CI: 1.46-4.24) compared to a non-cream/custard donut.

- The odds that a person was ill after eating an unfilled donut was 2.48 times higher (95% CI: 1.21-5.69) compared to a person who did not eat an unfilled donut.
- These data should be interpreted with caution due to the low number of non-cases among respondents, the inability to employ active case finding in this outbreak, and the recall bias of respondents.
- A nested case-control study was therefore undertaken in the largest defined cohort, the [REDACTED]

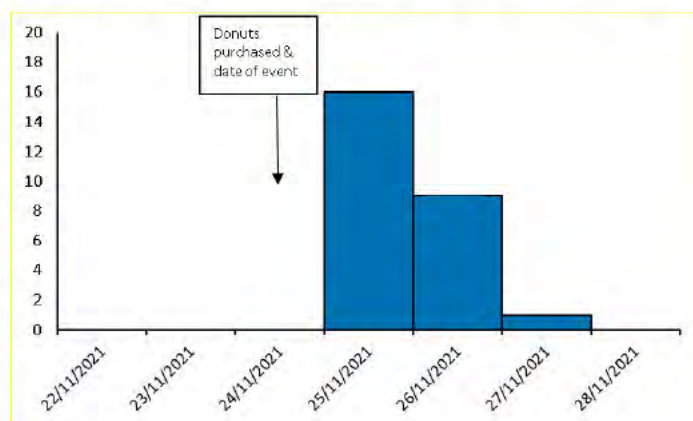
Case control study

- The [REDACTED] hosted a catered morning tea at 10:30hrs on 24 November 2021.
- The catering from Mrs Kim's Donuts contained a mixture of 192 donuts, including filled and unfilled donuts, purchased the morning of the event.
- No other foods were provided at this event, and no other catered/group meals were provided during the work week from 22 November to 26 November.
- 140 people attended the morning tea
- 59 attendees completed the survey
- Of the 59 attendees, 27 met the case definition. An additional 5 attendees reported a milder illness without vomiting or diarrhoea.
- The age and sex distribution of the [REDACTED] cohort is shown in Table 4.
- An epidemic curve of the [REDACTED] cohort is shown in Figure 2.

Table 4: Age and sex of ill and not-ill respondents, [REDACTED] outbreak, 24 November 2021.

	Ill	Not ill	Total
Total	27	32	59
Sex			
<i>Male</i>	103	38	39
<i>Female</i>	112	47	20
<i>Missing</i>	0	0	0
Age			
<i>0-19 years</i>	0	0	0
<i>20-39 years</i>	22	22	44
<i>40-59 years</i>	5	10	15
<i>60 years +</i>	0	0	0
<i>Missing</i>	0	0	0

Figure 2: Epidemic curve of the [REDACTED] outbreak, 24 November 2021.



- The main features of illness associated with the [REDACTED] cohort were:
 - The median incubation period was 35.1 hours (range 12.5-71.4 hours, IQR 31.3-45.2 hours)
 - The median illness duration was 38.8 hours (range 3.5-87 hours, IQR 22-66 hours)
- A summary of the attack rates by filling type and top donut flavours consumed is shown at Table 5.
- The only statistically significant association was found between eating any kind of filled donut and a person becoming unwell, and the uncertainty interval for this association is wide (OR:7.56, 95% CI: 1.22-200.61).

Table 5: Summary of attack rates and odds ratios for donuts, by filling type and the most commonly eating flavours, served at the [REDACTED] outbreak, 24 November 2021.

Donut eaten	Exposed				Unexposed				OR	95% CI
	Ill	Not Ill	Total	AR	Ill	Not Ill	Total	AR		
Any donut	27	32	59	45.8%	0	0	0	N/A	N/A	N/A
Donut filling type										
Any filled donut	26	24	50	52.0%	1	8	9	11.1%	7.56	1.22-200.61
Any cream/custard filled donut	15	16	31	48.4%	12	16	28	42.9%	1.24	0.44-3.56
Any caramel/jam/nutella filled donut	7	8	15	46.7%	20	24	44	45.5%	1.05	0.31-3.50
Any unfilled donut	5	3	8	62.5%	22	29	51	43.1%	2.13	0.45-12.07
Top donut flavours										
Nutella*	4	5	9	44.4%	23	27	50	46.0%	0.95	0.20-4.13
Vanilla custard*	4	3	7	57.1%	23	29	52	44.2%	1.65	0.31-9.73
Dark chocolate mousse*	0	4	4	0.0%	27	28	55	49.1%	N/A	N/A
Crème brûlée*	1	3	4	25.0%	26	27	53	49.1%	0.4	0.13-3.76
Salted caramel*	3	1	4	75.0%	24	31	55	43.6%	3.5	0.38-105.01
Cookies and cream*	2	2	4	50.0%	25	30	55	45.5%	1.2	0.12-12.18

Note: * have a cream/custard filling made at the food premises, *have a pre-bought Nutella, salted caramel, or jam filling

Discussion

- Cases in this outbreak reported mild illness a median incubation period of 33 hours and a median symptom duration of 48 hours. Most cases reported diarrhoea, abdominal cramps, and vomiting. Fewer cases reported fever, and less than 10% of cases reported blood in stool.

- These features satisfy Lively's criteria¹ and are suggestive of *Norovirus* infection. This pathogen typically has an incubation period of 10-50 hours (mean 24-48hrs) and symptom duration of 1-3 days. Symptoms of *Norovirus* include abdominal cramps, diarrhoea, nausea, vomiting, and myalgia.
- Norovirus is highly infectious and is spread from the vomit or faeces of an infected person. Infection can occur from close person-to-person contact, consuming contaminated food or drink (often contaminated through poor food handling or poor hand washing), or contact with contaminated objects or surfaces (such as door and tap handles).
- While all ill cases reported eating a donut no single flavour or filling type was identified as an increased source of infection. This suggests an ill food handler may have contaminated multiple donuts during the cooking, decoration, or serving processes. However, the mode of contamination remains unclear, and the lack of statistically significant associations in this study may also be explained in part by the sampling methods and potential bias in the sample towards ill patrons.

Limitations

- The epidemiological study was subject to:
 - Selection bias from the sampling method and response bias
 - sampling method: this outbreak relied on reports of illness being reported directly to ACT health and snowballing among contacts. No active case finding was undertaken to seek out well patrons. These limitations may bias the data towards ill patrons and limits the internal validity and certainty in the epidemiological investigation.
 - response bias: the respondents in this outbreak likely bias towards ill patrons, who may be more motivated to complete an interview or survey than their non-ill counterparts.
 - Measurement bias affected by the recall of participants, self-reporting, and change in data collection instruments. It is unclear if measurement bias has had a differential impact on ill or non-ill respondents, or
 - recall bias: interviews/surveys were conducted up to 21 days after purchasing the food product. This may affect a respondents recall of timing of events, duration of illness (if present), and memory of flavour/s consumed.
 - Self-reporting and misclassification: survey respondents self-reported symptom profile and dates and times of events without further clarification being sought that would occur in a phone interview (e.g., whether blood in stool or from another source, clarifying dates that appear contradictory). This may impact the quality of data collected.
 - interviewer bias: data collection was a mix of phone interviews and electronic surveys. Respondents to phone interviews may have been subject to differential levels of probing by different interviewers and compared to the survey where the questions were worded the same for all respondents. Resourcing constraints also required 3-day food history to be dropped from 29 November 2021, limiting the capacity to review other potential food poisoning sources. This may have affected the quality of data collected.

Environmental Health Investigation

Initial site inspection

- For EH.

Second site inspection

- For EH.

Interview with proprietor

- For EH.

Laboratory Investigation

Food and environmental samples

- For EH.

Human samples

- 10 stool specimens were collected from ill respondents.
 - Eight specimens were positive for norovirus. This included two specimens that initially returned negative norovirus antigen results.
 - Two specimens were negative for norovirus, and all pathogens screened for in the laboratory tests.
 - One of the norovirus positive specimens was also positive for *dientameoba fragilis* and *aeromonas* species.
 - The clinical significance and pathogenicity of *dientameoba fragilis* is unclear and is not considered to be a likely cause of illness.
 - *Aeromonas* species can be associated with diarrheal disease in humans but has also been reported as a common isolate among asymptomatic individuals. Contact with fresh or estuarine water is the most common source of infection, and this pathogen has not been associated with foodborne illness outbreaks in Australia².
 - Norovirus is considered to be the likely pathogen causing illness in this outbreak.

Conclusion

- A foodborne pathogen caused illness in 215 people surveyed who reported eating a donut from Mrs Kim's Donuts purchased between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive.
- Cases in this outbreak reported mild illness a median incubation period of 33 hours and a median symptom duration of 48 hours. Most cases reported diarrhoea, abdominal cramps, and vomiting.
- The symptom profile of this outbreak satisfied Lively's criteria for norovirus and was supported by eight positive norovirus samples.
- All cases ate at least one donut. No single flavour or filling type was found to result in greater odds of illness.
- The source of contamination with norovirus remains unknown. However, it is suspected that a food handler may have attended work while infectious and potentially contaminated the donuts through the cooking, decoration, or serving processes.
- This investigation highlights the potential for a foodborne illness outbreak in a food product traditionally considered lower risk.
- Future foodborne illness outbreaks should employ active case finding where possible to provide greater certainty in the investigation and its findings.

- This outbreak was a single incident related to food processing practices specific to the food prepared for the event. There is no ongoing public health risk.

Contact:	Keeley Allen
Position:	MAE Scholar
Phone:	5124 6215

Reference List

¹ Lively JY, Johnson SD, Wikswo M, Gu W, Leon J, Hall AJ. Clinical and epidemiologic profiles for identifying norovirus in acute gastroenteritis outbreak investigations. In *Open forum infectious diseases* 2018 Apr (Vol. 5, No. 4, p. ofy049). US: Oxford University Press.

² Fernández-Bravo A, Figueras MJ. An update on the genus *Aeromonas*: taxonomy, epidemiology, and pathogenicity. *Microorganisms*. 2020 Jan;8(1):129.

From: Ruthenberg, Jennifer (Health)
Sent: Tuesday, 11 January 2022 13:06
To: Jennings, Verity (Health)
Subject: RE: Mrs Kim's Donuts - complaint from [REDACTED]

OFFICIAL

I will chase with Nevada.

Thanks

Jennifer Ruthenberg | Assistant Director Food Safety and Audit
Ph: 02 5124 9256 | Email: jennifer.ruthenberg@act.gov.au
Environmental Health, Health Protection Service, Public Health Protection and Regulation | ACT Health Directorate
25 Mulley Street, Holder ACT 2611
health.act.gov.au



This email and any of its attachments may be confidential. If you are not the intended recipient please notify the sender and delete immediately. You should not copy or use it for any purpose, nor disclose its contents to any other person.

From: Jennings, Verity (Health) <Verity.Jennings@act.gov.au>
Sent: Tuesday, 11 January 2022 12:20 PM
To: Ruthenberg, Jennifer (Health) <Jennifer.Ruthenberg@act.gov.au>
Subject: FW: Mrs Kim's Donuts - complaint from [REDACTED]
Importance: High

OFFICIAL

Hi Jenny,

This was received into the EH inbox.

I think it should be forwarded to CDC; but thought it best to go through yourself rather than a direct send, just in case.

Can you please review and advise?

Thank you,

Verity Jennings | Assistant Director Food Safety | Food Safety Auditor
Pronoun she / her
Ph: 02 5124 6124 / [REDACTED] | Email: verity.jennings@act.gov.au

Environmental Health, Health Protection Service, Public Health, Protection and Regulation | ACT Health Directorate
25 Mulley Street Holder ACT 2611
health.act.gov.au

This email and any of its attachments may be confidential. If you are not the intended recipient please notify the sender and delete immediately. You should not copy or use it for any purpose, nor disclose its contents to any other person.

From: HPSReception <HPSReception@act.gov.au>
Sent: Monday, 10 January 2022 5:09 PM
To: Environmental Health <EnvironmentalHealth@act.gov.au>
Subject: Mrs Kim's Donuts - complaint from [REDACTED]

OFFICIAL

Hi team,

Today I had a phone call from [REDACTED]
Ph. [REDACTED]

Re: Mrs Kim's Donuts - complaint from [REDACTED]
[REDACTED]

Kind Regards,

Kay Carswell | Admin Officer, Business Management Services

Ph: 02 5124 9700 | Email: hps@act.gov.au

Health Protection Services | Public Health, Protection and Regulation

Health System Policy & Research | ACT Health Directorate | ACT Government

25 Mulley Street, Holder ACT 2611 | Locked Bag 5005, Weston Creek ACT 2611 | health.act.gov.au



From: Allen, Keeley (Health)
Sent: Tuesday, 11 January 2022 14:00
To: Pingault, Nevada (Health)
Cc: Stefanovic, Milica (Health)
Subject: RE: Mrs Kim's Donuts - complaint from [REDACTED]

OFFICIAL

Hi Nevada,

[REDACTED]

When we receive it, do I send it through to you or Alison?

Best,
Keeley

From: Pingault, Nevada (Health) <Nevada.Pingault@act.gov.au>
Sent: Tuesday, 11 January 2022 1:44 PM
To: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>
Subject: FW: Mrs Kim's Donuts - complaint from [REDACTED]
Importance: High

OFFICIAL

Hi Keeley,

Can you please give this person a call and clarify what the issue is?

[REDACTED]

Many thanks,
Nevada

From: Ruthenberg, Jennifer (Health) <Jennifer.Ruthenberg@act.gov.au>
Sent: Tuesday, 11 January 2022 12:49 PM
To: Pingault, Nevada (Health) <Nevada.Pingault@act.gov.au>
Subject: FW: Mrs Kim's Donuts - complaint from [REDACTED]
Importance: High

OFFICIAL

Hi Nevada

Hope you well.

The below email was sent through to us from the HPS inbox. Not sure what to do with this one?

Regards

Jennifer Ruthenberg | Assistant Director Food Safety and Audit

Ph: 02 5124 9256 | Email: jennifer.ruthenberg@act.gov.au

Environmental Health, Health Protection Service, Public Health Protection and Regulation | ACT Health Directorate

25 Mulley Street, Holder ACT 2611

health.act.gov.au



This email and any of its attachments may be confidential. If you are not the intended recipient please notify the sender and delete immediately. You should not copy or use it for any purpose, nor disclose its contents to any other person.

From: HPSReception <HPSReception@act.gov.au>

Sent: Monday, 10 January 2022 5:09 PM

To: Environmental Health <EnvironmentalHealth@act.gov.au>

Subject: Mrs Kim's Donuts - complaint from [REDACTED]

OFFICIAL

Hi team,

Today I had a phone call from [REDACTED]

Ph. [REDACTED]

Re: Mrs Kim's Donuts - complaint from [REDACTED]

Kind Regards,

Kay Carswell | Admin Officer, Business Management Services

Ph: 02 5124 9700 | Email: hps@act.gov.au

Health Protection Services | Public Health, Protection and Regulation

Health System Policy & Research | ACT Health Directorate | ACT Government

25 Mulley Street, Holder ACT 2611 | Locked Bag 5005, Weston Creek ACT 2611 | health.act.gov.au



From: Environmental Health
Sent: Wednesday, 12 January 2022 15:33
To: Huggett, Romaine (Health)
Subject: FW: Food poison investigation - Mrs Kim's Donuts

OFFICIAL

Hi Romaine,

Please ignore the below email.

Thanks,
Pallavi

Pallavi Konujula (she/her) | Customer Service Officer

Ph: 02 5124 6122 | Email: pallavi.konujula@act.gov.au

Environmental Health | Health Protection Service | Public Health Protection and Regulation | ACT Health Directorate

Howard Florey Centenary House, 25 Mulley Street Holder ACT 2611

health.act.gov.au



This email and any of its attachments may be confidential. If you are not the intended recipient please notify the sender and delete immediately. You should not copy or use it for any purpose, nor disclose its contents to any other person.

From: Environmental Health
Sent: Wednesday, 12 January 2022 3:26 PM
To: ACTHealthCommunicableDis@act.gov.au
Cc: Huggett, Romaine (Health) <Romaine.Huggett@act.gov.au>
Subject: FW: Food poison investigation - Mrs Kim's Donuts

OFFICIAL

Hello Team,

Keith advised that CDC coordinated the response to this outbreak in Nov-Dec 2021. Hence, forwarding for your attention and action.

Romaine – I wasn't sure if the email id I entered in the "To" field is the appropriate one, so I am copying you.

Thanks,
Pallavi

Pallavi Konujula (she/her) | Customer Service Officer

Ph: 02 5124 6122 | Email: pallavi.konujula@act.gov.au

Environmental Health | Health Protection Service | Public Health Protection and Regulation | ACT Health Directorate

Howard Florey Centenary House, 25 Mulley Street Holder ACT 2611

health.act.gov.au



This email and any of its attachments may be confidential. If you are not the intended recipient please notify the sender and delete immediately. You should not copy or use it for any purpose, nor disclose its contents to any other person.

From: HPS <HPS@act.gov.au>
Sent: Wednesday, 12 January 2022 1:17 PM
To: Environmental Health <EnvironmentalHealth@act.gov.au>
Subject: FW: Food poison investigation - Mrs Kim's Donuts

OFFICIAL

Lametred Jones | Team Leader
Phone: 02 5124 9700 | Email: lametred.jones@act.gov.au
Business Management Service, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate
25 Mulley Street Holder ACT 2611, Locked Bag 5005 Weston Creek ACT 2611
health.act.gov.au

From: [REDACTED]
Sent: Wednesday, 12 January 2022 1:17 PM
To: HPS <HPS@act.gov.au>
Subject: Food poison investigation - Mrs Kim's Donuts

CAUTION: This email originated from outside of the ACT Government. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Dear ACT Health,

From: Allen, Keeley (Health)
Sent: Wednesday, 12 January 2022 16:25
To: [REDACTED]
Subject: Food Poisoning Investigation
Attachments: Norovirus Gastroenteritis.pdf

OFFICIAL: Sensitive - Personal Privacy

Good afternoon,

Thank you for reaching out to us regarding your food poisoning complaint. The foodborne illness outbreak investigation for this food business has now closed.

Epidemiologists and Public Health Officers at ACT Health investigated a foodborne illness outbreak linked to consumption of food purchased from a Canberra food business. The symptom profile, symptom duration, and incubation period, which is the time from consuming the food to becoming ill, were consistent with infection from norovirus. Specimens collected from affected individuals were positive for norovirus.

Norovirus is a common virus that causes gastroenteritis (inflammation of the stomach and intestines). Norovirus is highly infectious and is spread from the vomit or faeces of an infected person. Infection can occur from close person-to-person contact, consuming contaminated food or drink (often contaminated as a result of poor food handling or poor hand washing), or contact with contaminated objects or surfaces (such as door and tap handles).

I have attached a short factsheet regarding norovirus infection which may assist you in preventing future illness.

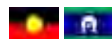
Best regards,
Keeley

Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngannawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.



Norovirus gastroenteritis

What is norovirus?

Norovirus is a very common virus that causes gastroenteritis (inflammation of the stomach and intestines). Common names used for gastroenteritis due to norovirus are 'gastric flu' or 'stomach flu', 'winter vomiting' and 'viral gastro'. It is highly contagious and often causes outbreaks, particularly in aged care facilities, childcare centres, schools and hospitals. Outbreaks can occur at any time of the year but are more common during winter and into spring.

What are the symptoms?

Illness caused by norovirus usually starts suddenly and causes vomiting and diarrhoea. Vomiting can be frequent and is more common in children. Other symptoms may include: nausea, abdominal pain, muscle aches, headaches, tiredness, and mild fever.

Symptoms of norovirus illness usually begin about 24 to 48 hours after ingestion of the virus, but they can appear as early as 12 hours after exposure. Illness generally lasts for one to three days. Dehydration is the most common complication of norovirus gastroenteritis.

How is it spread?

Norovirus is highly infectious and is spread from the vomit or faeces of an infected person. People are usually infectious from when their symptoms start until at least two days (48 hours) after the symptoms stop.

Infection can occur from:

- close person to person contact, for example shaking hands with someone who has been sick and has the virus on their hands;
- direct contact with the vomit or faeces of an infected person;
- contact with contaminated objects or surfaces (such as door and tap handles);
- consuming contaminated food or drink (often contaminated as a result of poor food handling or poor hand washing);
- inhaling virus particles that have remained in the air after a person has vomited; or
- consuming oysters and other shellfish that have been contaminated with norovirus.

Who is at risk of infection?

Norovirus can affect anyone. The illness is generally mild but if people are unable to drink enough fluids to replace what they lose through vomiting and diarrhoea, dehydration can become a problem. Infants, young children, the elderly and disabled persons are at greatest risk of dehydration.

How is it diagnosed?

Diagnosis is based on a person's symptoms and testing is not usually required. During outbreaks, it may be important to do testing to identify exactly what is causing people's illness in order to guide public health responses (and exclude non-viral causes). This involves testing samples of faeces.

How is it treated?

People with norovirus infection should rest and ensure they drink enough fluids. Most people will recover without complications. Oral rehydration solutions (available from the chemist) are specially formulated to rapidly replace lost fluid and maintain electrolyte (salts) balance. Norovirus infection can be serious for those who have difficulty replacing fluids and salts lost through vomiting and diarrhoea. Antibiotics will not help, because they fight bacteria, not viruses like norovirus.

How can norovirus gastroenteritis be prevented?

The most effective way of preventing norovirus gastroenteritis is to practice good hand washing. This is achieved by washing hands thoroughly using soap and running water for at least 10 seconds, followed by drying hands with a clean towel. This should be done before preparing food and before eating, after using the toilet, after changing nappies, after assisting someone with diarrhoea and/or vomiting, and after cleaning up body fluid spills.

What should I do if I have norovirus gastroenteritis symptoms to prevent spreading it to others?

While you have gastroenteritis symptoms, and for the 48 hours after the symptoms have resolved, it is important to keep your hands clean by washing them often and thoroughly. You should also avoid preparing food for people during this time.

Immediately remove and wash any clothes or bedding contaminated with vomit or diarrhoea using detergent and hot water. Clean contaminated surfaces (for example benches, floors and toilets) immediately using detergent and hot water. Then disinfect surfaces using a bleach-based product diluted according to the manufacturer's instructions.

Do people need to be excluded from school or work?

Anyone with vomiting or diarrhoea should rest at home and not attend work, school or childcare, or visit a hospital or residential care facility, until vomiting and diarrhoea have stopped for 48 hours. During this time they should not prepare food for others, or care for patients, children or the elderly.

Outbreaks due to norovirus

Outbreaks of norovirus gastroenteritis increase during winter and are common in settings such as aged care facilities, childcare centres and hospitals. Under the *Public Health Act 1997*, outbreaks of two or more cases of vomiting and/or diarrhoea in 24 hours should be notified to the Health Protection Service (HPS). HPS staff will be able to provide advice on controlling the outbreak.

Need more information?

For more information on norovirus gastroenteritis contact your doctor or call the Health Protection Service, Communicable Disease Control Information Line during business hours on **(02) 6205 2155**.

Communicable Disease Control Section at Health Protection Service is responsible for the investigation and surveillance of notifiable or infectious conditions in the ACT in order to control or prevent their spread in the community. This includes the promotion of immunisation, education and other strategies that help to limit the spread of diseases.

Acknowledgement

Heymann DL, 2015, Control of Communicable Diseases Manual, 20th edition.

Centers for Disease Control and Prevention, *Norovirus*, 2018. www.cdc.gov/norovirus

Accessibility

If you have difficulty reading a standard printed document and would like an alternative format, please phone 13 22 81.



If English is not your first language and you need the Translating and Interpreting Service (TIS), please call 13 14 50.

For further accessibility information, visit: www.health.act.gov.au/accessibility

www.health.act.gov.au | Phone: 132281 | Publication No HPS-00-0368

© Australian Capital Territory, Canberra, October 2018

From: Allen, Keeley (Health)
Sent: Thursday, 13 January 2022 09:56
To: Pingault, Nevada (Health)
Subject: FW: Food poisoning investigation - [REDACTED]
Attachments: IMG_20220111_165618.jpg

OFFICIAL: Sensitive - Personal Privacy

Hi Nevada,

[REDACTED]

Let me know if we need to do anything else to get this paid.

Best,
Keeley

From: [REDACTED]
Sent: Wednesday, 12 January 2022 5:12 PM
To: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>
Subject: Re: Food poisoning investigation - [REDACTED]

CAUTION: This email originated from outside of the ACT Government. Do not click links or open attachments unless you recognise the sender and know the content is safe.

[REDACTED]

Regards,

[REDACTED]

"Allen, Keeley (Health)" <Keeley.Allen@act.gov.au> wrote on Jan 12, 2022 4:12 PM:

OFFICIAL: Sensitive - Personal Privacy

Dear [REDACTED],

Thank you for your time on the phone and for assisting us in our recent outbreak investigation.

[REDACTED]

Best regards,
Keeley

Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.



This email, and any attachments, may be confidential and also privileged. If you are not the intended recipient, please notify the sender and delete all copies of this transmission along with any attachments immediately. You should not copy or use it for any purpose, nor disclose its contents to any other person.

From: Allen, Keeley (Health)
Sent: Thursday, 13 January 2022 10:14
To: [REDACTED]
Subject: RE: Food poisoning investigation - [REDACTED]

OFFICIAL: Sensitive - Personal Privacy

Thank you [REDACTED],

[REDACTED]

Best regards,
Keeley

Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.

From: [REDACTED]
Sent: Wednesday, 12 January 2022 5:12 PM
To: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>
Subject: Re: Food poisoning investigation - [REDACTED]

CAUTION: This email originated from outside of the ACT Government. Do not click links or open attachments unless you recognise the sender and know the content is safe.

[REDACTED]

Regards,

[REDACTED]

"Allen, Keeley (Health)" <Keeley.Allen@act.gov.au> wrote on Jan 12, 2022 4:12 PM:

OFFICIAL: Sensitive - Personal Privacy

Dear [REDACTED],

Thank you for your time on the phone and for assisting us in our recent outbreak investigation.

Best regards,
Keeley

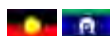
Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.

This email, and any attachments, may be confidential and also privileged. If you are not the intended recipient, please notify the sender and delete all copies of this transmission along with any attachments immediately. You should not copy or use it for any purpose, nor disclose its contents to any other person.

From: Allen, Keeley (Health)
Sent: Thursday, 20 January 2022 15:28
To: Pingault, Nevada (Health); Marmor, Alexandra (Health)
Subject: RE: Draft donuts report
Attachments: Draft Mrs Kim's Donuts Outbreak Summary report - 20220120.docx

Thank you both for your feedback,

I have an updated report [here](#) (and attached) with draft EH and laboratory sections. Let me know if we are happy to send through the draft report to EH for their review/additions.

Best,
Keeley

From: Pingault, Nevada (Health) <Nevada.Pingault@act.gov.au>
Sent: Friday, 14 January 2022 3:28 PM
To: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>; Marmor, Alexandra (Health) <Alexandra.Marmor@act.gov.au>
Subject: RE: Draft donuts report

Hi Keeley,

Thanks for putting this together! I've added comments/edits for your consideration.
I have found that you might have more success with EH if you write their section and send for comment rather than asking them to write from scratch!!

Cheers,
Nevada

From: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>
Sent: Monday, 10 January 2022 5:00 PM
To: Pingault, Nevada (Health) <Nevada.Pingault@act.gov.au>; Marmor, Alexandra (Health) <Alexandra.Marmor@act.gov.au>
Subject: Draft donuts report

Hi ladies,

I've put together a first draft of the donut outbreak report. I was hoping you would both be able to have a review and provide feedback before it is sent onto EH to complete their components. I recognise Alex that you may not have time before going on leave so there is no pressure.

The report is attached and it is saved [here](#).

Thank you in advance for your help.

Best,
Keeley

Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.





Health Protection Service

Howard Florey Centenary House, 25 Mulvey Street, Holder ACT 2611
 Locked Bag 5005, Weston Creek ACT 2611
 Phone: (02) 6205 1700 Fax: (02) 6205 1705
 Website: www.health.act.gov.au
 ABN: 88 407 290 295

OUTBREAK SUMMARY

Outbreak ID:	20210403		
Name of Institution:	Mrs Kim's Donuts		
Address:	9/15 Tench Street, Kingston ACT 2604		
Contact Person:		Phone:	
Email:		Fax:	
Date Notified:	25/11/2021	Date outbreak investigation commenced:	25/11/2021

Summary

- An outbreak of gastrointestinal illness affecting patrons of a donut shop in late November 2021 was investigated.
- Epidemiological, clinical, and environmental health investigations suggested the illnesses were caused by norovirus infection, following ingestion of donuts from purchased from the food business between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive.
- A total of 215 ill patrons were identified.
- No source of infection was identified; however, the suspected source was an unwell [REDACTED] and a lapse in safe food handling procedures.

Initial notifications

The Health Protection Service (HPS) received several food poisoning complaints over a four-day period that related to this food business. These complaints include direct reports that named the business as the complainant's primary suspected source of illness, and indirect reports that initially implicated another food business where the complainant also ate from Mrs Kim's Donuts.

Direct notifications

- On Thursday 25 November, the proprietor of Mrs Kim's Donuts notified HPS at ACT Health Directorate of a food poisoning complaint regarding gastroenteritis symptoms in 11 people following consumption of donuts.
- The Disease Surveillance team interviewed each family group on the afternoon of Thursday 25 November 2021.
 - 11 people across four households reported illness. All households included at least one sick person.
 - 100% of the ill people ate a donut from Mrs Kim's Donuts purchased on 20 November 2021.
 - The median time from eating donuts to symptom onset in this group was 29 hours (range 24-48 hours) and median duration of illness for those whose illness had resolved by time of interview was 48 hours (range 42-54 hours).

- The most common symptoms reported in this group were diarrhoea, abdominal pain, and vomiting. No individuals reported blood in the stool.
- The households had not seen or eaten with each other in the week prior. The fourth household was also in quarantine for COVID-19 at the time of exposure and illness.
- Separately, the ACT Health Environmental Health customer service line received two separate food poisoning complaints on Thursday 25 November 2021 from patrons who ate food from Mrs Kim's Donuts on 20 November 2021 and 21 November 2021. These complainants and their contacts were interviewed by the Disease Surveillance team on Thursday 25 November 2021.

Indirect notifications

- Health Protection Services also investigated three separate food poisoning complaints that initially implicated other businesses where investigation revealed the complainants also ate from Mrs Kim's Donuts.
 - ACT Health Environmental Health customer service line received a food poisoning complaint on Tuesday 23 November for a restaurant in Phillip. The complainant shared the meal among their household of 4 and 2 visiting family members.
 - All 6 family members reported becoming ill after eating from the restaurant on 20 November 2021, however no single food source was identified.
 - The Disease Surveillance Team reinterviewed the family on 29 November 2021 to confirm if any of the 6 had eaten a product from Mrs Kim's Donuts
 - The family confirmed they had eaten from Mrs Kim's Donuts 1.5 days before symptom onset.
 - On Friday 26 November, a team doctor for [REDACTED] contacted the Disease Surveillance team to report multiple sick team members following consumption of milkshakes from [REDACTED] Braddon at a team gathering.
 - The team doctor was reinterviewed on Monday 29 November 2021 and confirmed the team had also eaten donuts from Mrs Kim's Donuts.
 - All 19 team members were surveyed on Monday 29 November 2021.
 - On Tuesday 23 November, a complaint was received regarding two people becoming unwell after eating food from [REDACTED] Kingston. In their 3-day food history completed on Thursday 25 November, the complaint and their partner also mentioned eating Mrs Kim's Donuts the meal prior to [REDACTED].

Hypothesis

- The symptoms, duration and incubation period were suggestive of a viral infection, particularly norovirus.
- While all ill patrons reported eating a donut, no one flavour was identified at initial interview, suggesting that the source may have been due to a common ingredient, food handler and/or environmental contamination.

Case definition

A **case** in this outbreak is defined as:

A person who reported diarrhoea and/or vomiting to ACT Health following the consumption of a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021 inclusive.

A **non-case – mild illness** in this outbreak is defined as:

A person who reported at least one of abdominal pain, body aches/pains, headaches, and nausea after consuming a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021 inclusive.

A **non-case** in this outbreak was defined as:

A person who did not reported gastrointestinal symptoms (diarrhoea and/or vomiting) after consuming a donut purchased in the Australian Capital Territory from Friday 19 November 2021 to Saturday 27 November 2021 inclusive.

Individuals were excluded from the analysis if:

- Time from consumption to illness onset was less than 6 hours, and no chronic gastrointestinal health conditions were reported,
- No food products were consumed from the food business,
- Food products were consumed earlier than Saturday 20 November 2021, or
- Food products were consumed later than Wednesday 24 November 2021

Epidemiological Investigation

- The investigation team was led by Keeley Allen (MAE Scholar), with assistance from Felicity Greenville (Public Health Nurse), Dr Nevada Pingault (Surveillance Manager), Alexandra Marmor (Surveillance Coordinator), Fotis Sgouros (Vaccine Data Entry Officer), Raleigh Evans (Vaccine Delivery Officer), and Algreg Gomez (MAE Scholar).
- Active case finding was not able to be undertaken for this outbreak because:
 - most orders were purchased by walk in customers.
 - check-In CBR data is strictly for the purpose of COVID-19 contact tracing.
 - The food business denied keeping order records.
 - obtaining order lists from [REDACTED] was proposed by the investigation team, however this was not approved by the Deputy CHO's office.
 - no media statements were released by ACT Health.
- Affected patrons did contact media outlets to complain about their illness, resulting in a number of news articles.
- This investigation relied on passive case finding by identifying contacts who shared donuts with complainants and responding to complaints made from the public in response to news items.
- Food poisoning complaints were diverted to the Disease Surveillance Team on Friday 26 December 2021 for an initial triage interview to confirm if the complaint was related to this outbreak. If the complaint was regarding another food business, the complainant was directed back to the Environmental Health team.
- Case questionnaires were completed using three methods:
 - Phone interviews – all complainants interviewed on 25 and November, who only provided a landline phone number, or required a translator had interviews conducted over the phone. Interview data was held in a REDCap instrument.
 - REDCap survey – a REDCap survey was implemented on Monday 29 November for complaints received from that date onwards. Complainants and their contacts who shared the meal were emailed or texted the link to a self-administered survey. A reminder was sent to complainants

if a response was not received one week after the first email from the Disease Surveillance team.

- REDCap cohort surveys – separate REDCap instruments were set up for defined cohorts that were identified from initial complaints. These cohorts included four work-related functions, and the [REDACTED]. The cohort surveys were self-administered and mirrored the general REDCap survey. One point of contact from each cohort was asked to distribute the surveys within their organisation.
- Interviews/surveys were conducted for ill and well patrons.
- The interviews/surveys collected information on symptoms, illness onset, illness duration, severity, foods eaten (including specific donut flavours), date purchased, dates eaten, and contact details of anyone who ate the product with the individuals. No fields were mandatory.
- 3-day food history questions were discontinued from Monday 29 January due to the volume of complaints received, and the increasing certainty of the food business as the source of infection.
- Interviews/surveys were conducted from Thursday 25 November 2021 to Friday 10 December 2021.
- The menu for 20 November to 24 November was requested from the food business, who stated they did not keep records of what flavours or volumes were sold on what days, and did not have a set menu, nor any patterns in what flavours were made on what days.
 - Menu items were identified from a menu posted on [REDACTED] and from initial case interviews.
- Donut flavours were categorised by filling type
 - Unfilled
 - Caramel/jam/Nutella filling – these were pre-bought fillings with no additional preparation by the food business
 - Cream/custard filling – these fillings were made on site by the food business.
- The investigation team determined that an analytical study could not be conducted for the overall outbreak as identifying sufficient controls was not possible through passive case finding.
 - A case-control study was conducted for the largest cohort within the outbreak, the [REDACTED]
- A line-list of respondents was created from the REDCap exports and analysed in Microsoft Excel and R.

Results

- The total number of patrons who consumed donuts in the study period was unknown.
- The Disease surveillance team interviewed or surveyed 301 individuals.
- 215 respondents met the case definition (71% of respondents).
- A further 16 cases reported a milder illness without vomiting and/or diarrhoea and did not meet the case definition.
- The sex and age group profiles of the ill and not-ill groups are shown in Table 1.

Table 1: Age and sex of ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

	Ill N (%)	Not ill N (%)	Total
Total	215 (71%)	86 (29%)	301
Sex			

<i>Male</i>	103 (48%)	38 (44%)	141 (47%)
<i>Female</i>	112 (52%)	47 (55%)	159 (53%)
<i>Missing</i>	0 (0%)	1 (1%)	1 (<1%)
Age			
<i>0-19 years</i>	15 (7%)	8 (9%)	23 (8%)
<i>20-39 years</i>	130 (60%)	48 (56%)	178 (59%)
<i>40-59 years</i>	42 (20%)	16 (19%)	58 (19%)
<i>60 years +</i>	16 (7%)	2 (2%)	18 (6%)
<i>Missing</i>	12 (6%)	12 (14%)	24 (8%)

- All patrons (ill and not ill) ate a donut from the food premises bought between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive. Most patrons purchased a donut on 20 November (a Saturday, the busiest trading day for the food premises) or 24 November (a Wednesday with three work functions catered) (Table 2).

Table 2: Date of purchase by ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

Date of purchase	Ill N (%)	Not ill N (%)	Total
20/11/2021	84 (39%)	13 (15%)	97 (32%)
21/11/2021	39 (18%)	12 (14%)	51 (17%)
22/11/2021	14 (7%)	2 (2%)	16 (5%)
23/11/2021	29 (13%)	8 (9%)	37 (12%)
24/11/2021	48 (22%)	50 (86%)	98 (33%)
Missing	1 (<1%)	1 (1%)	2 (<1%)
Total	215 (100%)	86 (100%)	301 (100%)

- Most cases became unwell in the late hours of 21 November 2021 or the late hours of 22 November 2021 (Figure 1).
- Most respondents (n=195) purchased and ate as an individual purchase or in a small social group. 106 respondents ate as part of one of five defined cohorts (Table 3).

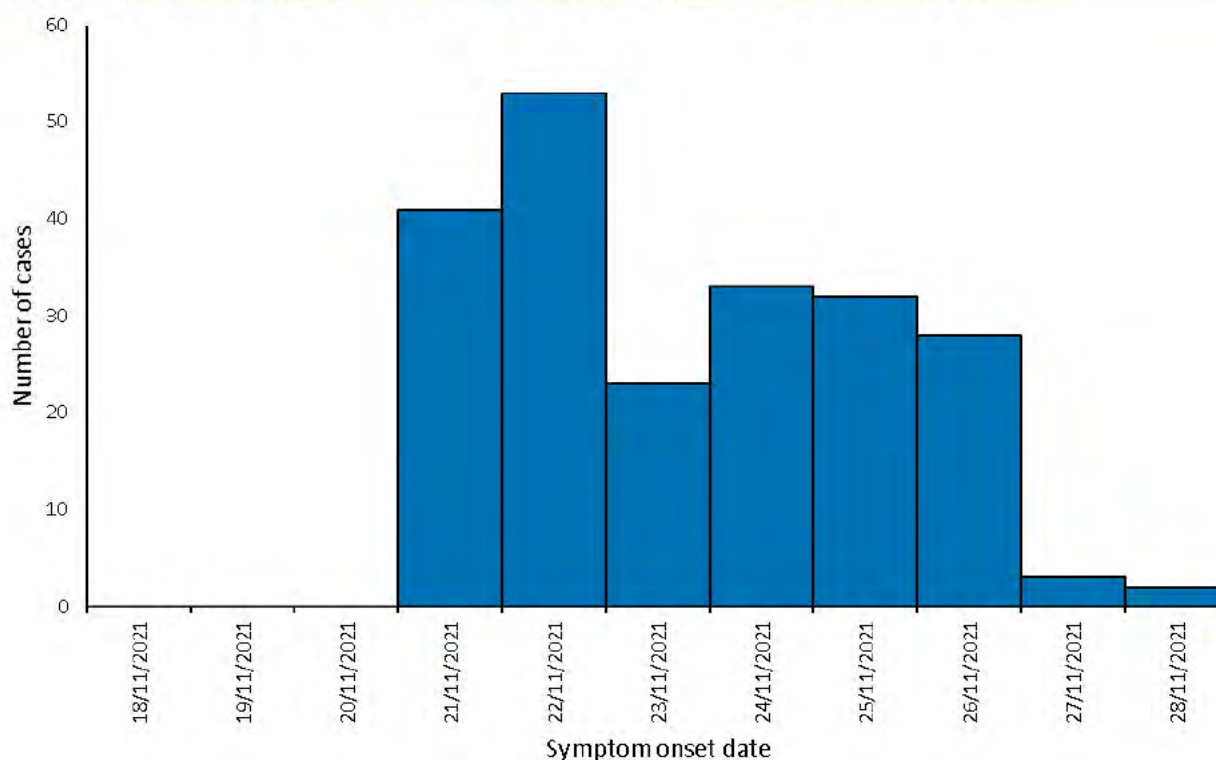
Figure 1: Onset of illness of respondents, Mrs Kim's Donuts outbreak, November 2021.**Table 3: Nested cohorts and attack rates , Mrs Kim's Donuts outbreak, November 2021.**

Table 3: Nested cohorts and attack rates, NHS Kirk's Bonnets Outbreak, November 2021.					
Cohort	Date of event	Ill		Total respondents	AR – respondents
		Ill	Not Ill		
	20/11/2021	8	11	19	42.1%
	23/11/2021	11	4	15	72.7%
	23/11/2021	3	1	4	75%
	24/11/2021	5	4	9	55.6%
	24/11/2021	27	32	59	45.8%

Note: [redacted] had 19 attendees, and [redacted] had 140 attendees. The number of attendees for all other events is not known

- The main features of illness associated with this outbreak were:
 - median incubation period was 33.5 hours (range 6.27 – 138 hours, IQR 28.6-42.4 hours).
 - median duration of symptoms was 48 hours (range 3 – 174.5 hours, IQR 29.3-72 hours)
 - diarrhoea, vomiting and/or abdominal pain were the most common symptoms reported
 - one case was hospitalised as a result of their illness. This case had a short incubation period (6.26 hours). The discharge summary from hospital was reviewed and indicted they had previously had gastric sleeve surgery. This medical history was deemed a significant effect modifier, and the individual was included as a case.
 - this outbreak includes 8 likely cases of secondary transmission among household members. These 8 cases reported an incubation period of greater than 96 hours from eating a donut, and prior to their onset, at least one other member of their household was ill after consuming a donut.
- These data should be interpreted with caution due to do the low number of non-cases among respondents, the inability to employ active case finding in this outbreak, and the recall bias of respondents.

- A nested case-control study was undertaken in the largest defined cohort, the [REDACTED]

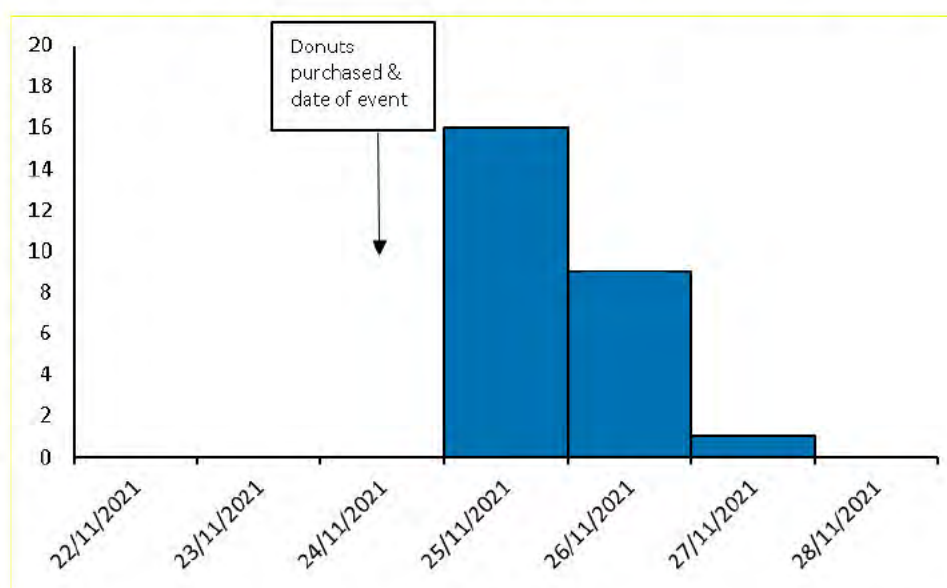
Case control study

- The [REDACTED] hosted a catered morning tea at 10:30hrs on 24 November 2021.
- The catering from Mrs Kim's Donuts contained a mixture of 192 donuts, including filled and unfilled donuts, purchased the morning of the event.
- No other foods were provided at this event, and no other catered/group meals were provided during the work week from 22 November to 26 November.
- 140 people attended the morning tea
- 59 attendees completed the survey
- Of the 59 attendees, 27 met the case definition. An additional 5 attendees reported a milder illness without vomiting or diarrhoea.
- The age and sex distribution of the [REDACTED] cohort is shown in Table 4.
- An epidemic curve of the [REDACTED] cohort is shown in Figure 2.

Table 4: Age and sex of ill and not-ill respondents, [REDACTED] outbreak, 24 November 2021.

	Ill	Not ill	Total
Total	27	32	59
<i>Sex</i>			
<i>Male</i>	103	38	39
<i>Female</i>	112	47	20
<i>Missing</i>	0	0	0
<i>Age</i>			
<i>0-19 years</i>	0	0	0
<i>20-39 years</i>	22	22	44
<i>40-59 years</i>	5	10	15
<i>60 years +</i>	0	0	0
<i>Missing</i>	0	0	0

Figure 2: Epidemic curve of the [REDACTED] outbreak, 24 November 2021.



- The main features of illness associated with the [REDACTED] cohort were:
 - The median incubation period was 35.1 hours (range 12.5-71.4 hours, IQR 31.3-45.2 hours)
 - The median illness duration was 38.8 hours (range 3.5-87 hours, IQR 22-66 hours)
- A summary of the attack rates by filling type and top donut flavours consumed is shown at Table 5.
- The only statistically significant association was found between eating any kind of filled donut and a person becoming unwell, however the confidence interval for this association is wide (OR:7.56, 95% CI: 1.22-200.61).

Table 5: Summary of attack rates and odds ratios for donuts, by filling type and the most commonly eating flavours, served at the [REDACTED] outbreak, 24 November 2021.

Donut eaten	Exposed				Unexposed				OR	95% CI
	Ill	Not Ill	Total	AR	Ill	Not Ill	Total	AR		
Any donut	27	32	59	45.8%	0	0	0	N/A	N/A	N/A
Donut filling type										
Any filled donut	26	24	50	52.0%	1	8	9	11.1%	7.56	1.22-200.61
Any cream/custard filled donut	15	16	31	48.4%	12	16	28	42.9%	1.24	0.44-3.56
Any caramel/jam/Nutella filled donut	7	8	15	46.7%	20	24	44	45.5%	1.05	0.31-3.50
Any unfilled donut	5	3	8	62.5%	22	29	51	43.1%	2.13	0.45-12.07
Most frequently consumed donut flavours										
Nutella [^]	4	5	9	44.4%	23	27	50	46.0%	0.95	0.20-4.13
Vanilla custard [*]	4	3	7	57.1%	23	29	52	44.2%	1.65	0.31-9.73
Dark chocolate mousse [*]	0	4	4	0.0%	27	28	55	49.1%	N/A	N/A
Crème Brûlée [*]	1	3	4	25.0%	26	27	53	49.1%	0.4	0.13-3.76
Salted caramel [^]	3	1	4	75.0%	24	31	55	43.6%	3.5	0.38-105.01
Cookies and cream [*]	2	2	4	50.0%	25	30	55	45.5%	1.2	0.12-12.18

Note: * have a cream/custard filling made at the food premises, [^]have a pre-bought Nutella, salted caramel, or jam filling

Environmental Health Investigation

Initial site inspections – 25 November 2021

- An initial site inspection was conducted at 15:30hrs on 25 November 2021. Prior to inspection, the proprietor had informed HPS there were no food specimens on site.
- Staff have designated activities during preparation; with separate staff for baking such as dough preparation and frying, and for decorating, including custard or filling preparation, piping fillings, icing donuts.
- Dough making is kept separate from other activities in premises in separate mixing bowls. Proofing and cooking of donuts are automated.
- Custard and cream fillings are made on site and do not contain eggs. Custard fillings are made in batches using sugar, milk, and custard powder, with purchased flavourings added.
- Flavourings are stored in tubs and used 'until empty', which was advised by staff as a 2-day period. Compliance with storage times was unconfirmed due to date labels missing from some storage containers.
- The food business uses reusable piping bags for fillings.
- Staff reported using tea towels to rest cooking utensils and for wiping hands.
- Staff reported serving donuts wearing gloves and using tongs.
- No food preparation nor serving staff have reported being unwell. The proprietor initially reported only two staff members worked at the business.
- At the initial site inspection, 10 environmental swabs were taken of surfaces, mixing equipment, and door handles.
- There was evidence of food preparation at the initial site inspection. A second inspection was conducted at 1800 hrs to collect six food samples, 7 additional environmental swabs, and 1 piping bag.
- No cloths or tea towels were removed for sampling as none were present at the 1800hrs inspection.
- A Listeria clean was recommended by the Environmental Health team on 26 November 2021 as the pathogen was unknown.
- A review of the food grade cleaning sanitiser product indicated it was at similar levels to photographs taken at the initial registration inspection in July 2021.
- The proprietor was advised that they did not require clearance or approval from HPS to reopen, as the business had voluntarily closed.

Second site inspection

- A second site inspection was attempted on 29 November 2021. The proprietor indicated they were interstate.
- The proprietor was contacted by phone and reiterated only two staff had worked in the period of interest, and there were no customers unwell during this period.

Third site inspection

- A third site inspection was arranged for 1 December 2021. The proprietor initially accepted, and then declined.

- The proprietor was contacted by phone and reiterated only two staff had worked in the period of interest, and there were no customers unwell during this period.

Interview with proprietor

- An interview with staff was conducted at HPS.
- Following reports from complainants of additional staff onsite, the proprietor revised their initial statement to indicate two additional staff had been working onsite during the study period in serving roles.
- The Environmental Health team provided an overview of norovirus infection and transmission pathways for this pathogen.

Laboratory Investigation

Food and environmental samples

- Environmental swabs, and the piping bag were tested for two primary pathogens:
 - 10 environmental samples and piping bag to be tested for *Salmonella* spp
 - 7 environmental swabs were tested for *Listeria monocytogenes*
- The environmental swabs and piping bag also returned negative results.
- Food samples were tested for *Salmonella*, *L. monocytogenes*, *E. coli*, SPC, *Clostridium perfringens*, *Staph aureus*, *Bacillus*, and coliforms (a hygiene indicator).
- Food samples were negative for the tested pathogens.
- Two food samples returned coliform results:
 - Tiramisu filling – a custard-based filling prepared on site, coliform MPN per gram of 4.5
 - Cream filling – prepared on site, coliform MPN per gram of 920.0
- A sample of white chocolate icing recorded a SOC result of 33,000, which was considered an unusual result for an icing product. The interview with the food business found that the same scoop had repeatedly been used for the white chocolate buds and may provide a vehicle for contamination.
- The coliform results may be indicative of a hand hygiene, storage, or cleaning issue.
- Testing for norovirus in food and environmental samples is not able to be conducted by ACTGAL.

Human samples

- 10 stool specimens were collected from ill respondents.
 - Eight specimens were positive for norovirus. This included two specimens that initially returned negative norovirus antigen results when tested at private pathology but were PCR positive when tested at ACT Pathology.
 - Two specimens were negative for norovirus, and all pathogens screened for in the laboratory tests. An additional specimen was collected, but had not requested norovirus testing, and was also negative for all pathogens screened for in the laboratory tests.
 - One of the norovirus positive specimens was also positive for *Dientamoeba fragilis* and *Aeromonas* species.

- The clinical significance and pathogenicity of *Dientamoeba fragilis* is unclear and is not considered to be a likely cause of illness.
- *Aeromonas* species can be associated with diarrhoeal disease in humans but has also been reported as a common isolate among asymptomatic individuals. Contact with fresh or estuarine water is the most common source of infection, and this pathogen has not been associated with foodborne illness outbreaks in Australia¹.

Discussion

- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median illness duration of 48 hours. Fewer cases reported fever, and less than 10% of cases reported blood in stool.
- These features satisfy Lively's criteria² and are suggestive of norovirus infection. This pathogen typically has an incubation period of 10-50 hours (mean 24-48hrs) and symptom duration of 1-3 days. Symptoms of norovirus include abdominal cramps, diarrhoea, nausea, vomiting, and myalgia. Norovirus is highly infectious and is spread from the vomit or faeces of an infected person. Infection can occur from close person-to-person contact, consuming contaminated food or drink (often contaminated through poor food handling or poor hand washing), or contact with contaminated objects or surfaces (such as door and tap handles).
- Foodborne norovirus outbreaks have historically been associated with foods that have no kill step (i.e., uncooked) and/or are subject to lots of handling, such as salads. Donuts have not been identified as a vehicle previously.
- While all ill cases reported eating a donut, no single flavour or filling type was identified as the likely source of infection. This suggests widespread contamination of the donuts sold by the food business. The most likely source of norovirus contamination in this outbreak was an ill food handler, who contaminated donuts during the cooking, decoration, or serving processes over multiple days. No food handlers admitted to working while ill.
- There were no reports of vomiting or diarrhoeal episodes at the store, making it unlikely that environmental contamination was the mode of transmission.

Limitations

- The epidemiological study was subject to:
 - Selection bias from the sampling method and response bias
 - sampling method: this outbreak relied on illness being reported directly to ACT Health and snowballing among contacts. No active case finding was undertaken to seek out well patrons. These limitations may bias the data towards ill patrons and limits the internal validity and certainty in the epidemiological investigation.
 - response bias: the respondents in this outbreak likely bias towards ill patrons, who may be more motivated to complete an interview or survey than their non-ill counterparts.
 - Measurement bias affected by the recall of participants, self-reporting, and change in data collection instruments. It is unclear if measurement bias has had a differential impact on ill or non-ill respondents, or
 - recall bias: interviews/surveys were conducted up to 21 days after purchasing the food product. This may affect a respondents recall of timing of events, duration of illness (if present), and memory of flavour/s consumed.

- Self-reporting and misclassification: survey respondents self-reported symptom profile and dates and times of events without further clarification being sought that would occur in a phone interview (e.g., whether blood in stool or from another source, clarifying dates that appear contradictory). This may impact the quality of data collected.
- interviewer bias: data collection was a mix of phone interviews and electronic surveys. Respondents to phone interviews may have been subject to differential levels of probing by different interviewers, compared with the survey where the questions were worded the same for all respondents. This may have affected the quality of data collected.

Conclusion

- At least 215 people had gastroenteritis after eating donuts purchased from Mrs Kim's Donuts Kingston between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive.
- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median symptom duration of 48 hours.
- The symptom profile of this outbreak satisfied Lively's criteria for norovirus and was supported by eight positive norovirus samples.
- All cases ate at least one donut. No single flavour or filling type was associated with illness.
- While the source of contamination was unable to be confirmed, it is suspected that a food handler worked while infectious and contaminated the donuts through the cooking, decoration and/or serving processes.
- This investigation highlights the potential for a foodborne illness outbreak in a food product not previously considered as a vehicle for norovirus.
- Future foodborne illness outbreaks should employ active case finding where possible to provide greater certainty in the investigation and its findings.
- Use of food home delivery service (i.e., [REDACTED], [REDACTED], [REDACTED]) records for investigation of foodborne outbreaks should be investigated.
- This outbreak was a single incident related to processing practices at the food business. No ongoing public health risk was identified.

Contact:	Keeley Allen
Position:	MAE Scholar
Phone:	5124 6215

Reference List

¹ Fernández-Bravo A, Figueras MJ. An update on the genus *Aeromonas*: taxonomy, epidemiology, and pathogenicity. *Microorganisms*. 2020 Jan;8(1):129.

² Lively JY, Johnson SD, Wikswo M, Gu W, Leon J, Hall AJ. Clinical and epidemiologic profiles for identifying norovirus in acute gastroenteritis outbreak investigations. In *Open forum infectious diseases* 2018 Apr (Vol. 5, No. 4, p. ofy049). US: Oxford University Press.

From: Allen, Keeley (Health)
Sent: Tuesday, 1 February 2022 09:50
To: Hudson, Lyndell (Health); Mirza, Arif (Health); Wansink, Victoria (Health); Waters, Natasha (Health)
Cc: Pingault, Nevada (Health)
Subject: Draft outbreak report for review - Mrs Kims Donuts
Attachments: Draft Mrs Kim's Donuts Outbreak Summary report - 20220128.docx

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning team,

Disease Surveillance have put together a draft report for the Mrs Kims Donut outbreak (attached). We have added in some draft text for the environmental investigation and the laboratory investigation based on the ART minutes but would appreciate your review and feedback.

Please provide your feedback on the attached by Friday 11 February 2022. Let me know if you have any questions or concerns in the meantime.

Thank you in advance for all your help.

Best regards,
Keeley

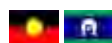
Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.





Health Protection Service

Howard Florey Centenary House, 25 Mulley Street, Holder ACT 2611
 Locked Bag 5005, Weston Creek ACT 2611
 Phone: (02) 6205 1700 Fax: (02) 6205 1705
 Website: www.health.act.gov.au
 ABN: 88 407 290 295

OUTBREAK SUMMARY

Outbreak ID:	20210403		
Name of Institution:	Mrs Kim's Donuts		
Address:	9/15 Tench Street, Kingston ACT 2604		
Contact Person:		Phone:	
Email:		Fax:	
Date Notified:	25/11/2021	Date outbreak investigation commenced:	25/11/2021

Summary

- An outbreak of gastrointestinal illness affecting patrons of a donut shop in late November 2021 was investigated.
- Epidemiological, clinical, and environmental health investigations suggested the illness were caused by norovirus infection, following ingestion of donuts purchased from the food business between Saturday 20 November 2021 and Wednesday 24 November 2021, inclusive.
- A total of 215 ill patrons were identified.
- The source of infection was not able to be confirmed; however, the suspected source was an unwell [REDACTED] and a lapse in safe food handling procedures.

Initial notifications

The Health Protection Service (HPS) received several food poisoning complaints over a four-day period that related to this food business. These complaints included direct reports that named the business as the complainant's suspected source of illness, and indirect reports that initially implicated another food business where the complainant also ate from Mrs Kim's Donuts.

Direct notifications

- On Thursday 25 November, the proprietor of Mrs Kim's Donuts notified HPS at ACT Health Directorate of a food poisoning complaint regarding gastroenteritis symptoms in 11 people following consumption of donuts.
- The Disease Surveillance team interviewed each family group on the afternoon of Thursday 25 November 2021.
 - 11 people across four households reported illness. All households included at least one sick person.
 - 100% of the ill people ate a donut from Mrs Kim's Donuts purchased on 20 November 2021.
 - The median time from eating donuts to symptom onset in this group was 29 hours (range 24-48 hours) and median duration of illness for those whose illness had resolved by time of interview was 48 hours (range 42-54 hours).

- The most common symptoms reported in this group were diarrhoea, abdominal pain, and vomiting. No individuals reported blood in the stool.
- The households had not seen or eaten with each other in the week prior. The fourth household was also in quarantine for COVID-19 at the time of exposure and illness.
- Separately, the ACT Health Environmental Health customer service line received two separate food poisoning complaints on Thursday 25 November 2021 from patrons who ate food from Mrs Kim's Donuts on 20 November 2021 and 21 November 2021. These complainants and their contacts were interviewed by the Disease Surveillance team on Thursday 25 November 2021.

Indirect notifications

- HPS also investigated three separate food poisoning complaints that initially implicated other businesses, but investigation revealed the complainants also ate from Mrs Kim's Donuts.
 - ACT Health Environmental Health customer service line received a food poisoning complaint on Tuesday 23 November for a restaurant in [REDACTED]. The complainant shared the meal among their household of 4 and 2 visiting family members.
 - All 6 family members reported becoming ill after eating from the restaurant on 20 November 2021, however no single food source was identified.
 - The Disease Surveillance Team reinterviewed the family on 29 November 2021 to confirm if any of the 6 had eaten a product from Mrs Kim's Donuts
 - The family confirmed they had eaten from Mrs Kim's Donuts 1.5 days before symptom onset.
 - On Friday 26 November, a team doctor for [REDACTED] contacted the Disease Surveillance team to report multiple sick team members following consumption of milkshakes from [REDACTED] Braddon at a team gathering.
 - The team doctor was reinterviewed on Monday 29 November 2021 and confirmed the team had also eaten donuts from Mrs Kim's Donuts.
 - All 19 team members were surveyed on Monday 29 November 2021.
 - On Tuesday 23 November, a complaint was received regarding two people becoming unwell after eating food from [REDACTED] Kingston. In their 3-day food history completed on Thursday 25 November, the complaint and their partner also mentioned eating Mrs Kim's Donuts the meal prior to [REDACTED].

Hypothesis

- The symptoms, duration and incubation period were suggestive of a viral infection, particularly norovirus.
- While all ill patrons reported eating a donut, no one flavour was identified at initial interview, suggesting that the source may have been due to a common ingredient, food handler and/or environmental contamination.

Case definition

A **case** in this outbreak is defined as:

A person who reported diarrhoea and/or vomiting to ACT Health following the consumption of a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021, inclusive.

A **non-case – mild illness** in this outbreak is defined as:

A person who reported at least one of abdominal pain, body aches/pains, headaches, and nausea after consuming a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021 inclusive.

A **non-case** in this outbreak was defined as:

A person who did not report gastrointestinal symptoms (diarrhoea and/or vomiting) after consuming a donut purchased from Mrs Kim's Donuts Kingston from Friday 19 November 2021 to Saturday 27 November 2021 inclusive.

Individuals were excluded from the analysis if:

- Time from consumption to illness onset was less than 6 hours, and no chronic gastrointestinal health conditions were reported,
- No food products were consumed from the food business,
- Food products were consumed earlier than Saturday 20 November 2021, or
- Food products were consumed later than Wednesday 24 November 2021

Epidemiological Investigation

- The investigation team was led by Keeley Allen (MAE Scholar), with assistance from Felicity Greenville (Public Health Nurse), Dr Nevada Pingault (Surveillance Manager), Alexandra Marmor (Surveillance Coordinator), Fotis Sgouros (Vaccine Data Entry Officer), Raleigh Evans (Vaccine Delivery Officer), and Algreg Gomez (MAE Scholar).
- Active case finding was not able to be undertaken for this outbreak because:
 - most orders were purchased by walk in customers.
 - check-In CBR data is strictly for the purpose of COVID-19 contact tracing.
 - The food business denied keeping order records.
 - obtaining order lists from [REDACTED] was proposed by the investigation team, however this was not approved by the Deputy CHO's office.
 - no media statements were released by ACT Health.
- Affected patrons did contact media outlets to complain about their illness, resulting in a number of news articles.
- This investigation relied on passive case finding by identifying contacts who shared donuts with complainants and responding to complaints made from the public in response to news items.
- Food poisoning complaints were diverted to the Disease Surveillance Team on Friday 26 December 2021 for an initial triage interview to confirm if the complaint was related to this outbreak. If the complaint was regarding another food business, the complainant was directed back to the Environmental Health team.
- Case questionnaires were completed using three methods:
 - Phone interviews – all complainants interviewed on 25 and November, who only provided a landline phone number, or required a translator had interviews conducted over the phone. Interview data was held in a REDCap instrument.
 - REDCap survey – a REDCap survey was implemented on Monday 29 November for complaints received from that date onwards. Complainants and their contacts who shared the meal were emailed or texted the link to a self-administered survey. A reminder was sent to complainants

if a response was not received one week after the first email from the Disease Surveillance team.

- REDCap cohort surveys – separate REDCap instruments were set up for defined cohorts that were identified from initial complaints. These cohorts included four work-related functions, and the [REDACTED]. The cohort surveys were self-administered and mirrored the general REDCap survey. One point of contact from each cohort was asked to distribute the surveys within their organisation.
- Interviews/surveys were conducted for ill and well patrons.
- The interviews/surveys collected information on symptoms, illness onset, illness duration, severity, foods eaten (including specific donut flavours), date purchased, dates eaten, and contact details of anyone who ate the product with the individuals. No fields were mandatory.
- 3-day food history questions were discontinued from Monday 29 January due to the volume of complaints received, and the increasing certainty of the food business as the source of infection.
- Interviews/surveys were conducted from Thursday 25 November 2021 to Friday 10 December 2021.
- The menu for 20 November to 24 November was requested from the food business, who stated they did not keep records of what flavours or volumes were sold on what days, and did not have a set menu, nor any patterns in what flavours were made on what days.
 - Menu items were identified from a menu posted on [REDACTED] and from initial case interviews.
- Donut flavours were categorised by filling type
 - Unfilled
 - Caramel/jam/Nutella filling – these were pre-bought fillings with no additional preparation by the food business
 - Cream/custard filling – these fillings were made on site by the food business.
- The investigation team determined that an analytical study could not be conducted for the overall outbreak as identifying sufficient controls was not possible through passive case finding.
 - A case-control study was conducted for the largest cohort within the outbreak, the [REDACTED]
- A line-list of respondents was created from the REDCap exports and analysed in Microsoft Excel and R.

Results

- The total number of patrons who consumed donuts in the study period was unknown.
- The Disease surveillance team interviewed or surveyed 301 individuals.
- 215 respondents met the case definition (71% of respondents).
- A further 16 cases reported a milder illness without vomiting and/or diarrhoea and did not meet the case definition.
- The sex and age group profiles of the ill and not-ill groups are shown in Table 1.

Table 1: Age and sex of ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

	Ill N (%)	Not ill N (%)	Total
Total	215 (71%)	86 (29%)	301
Sex			

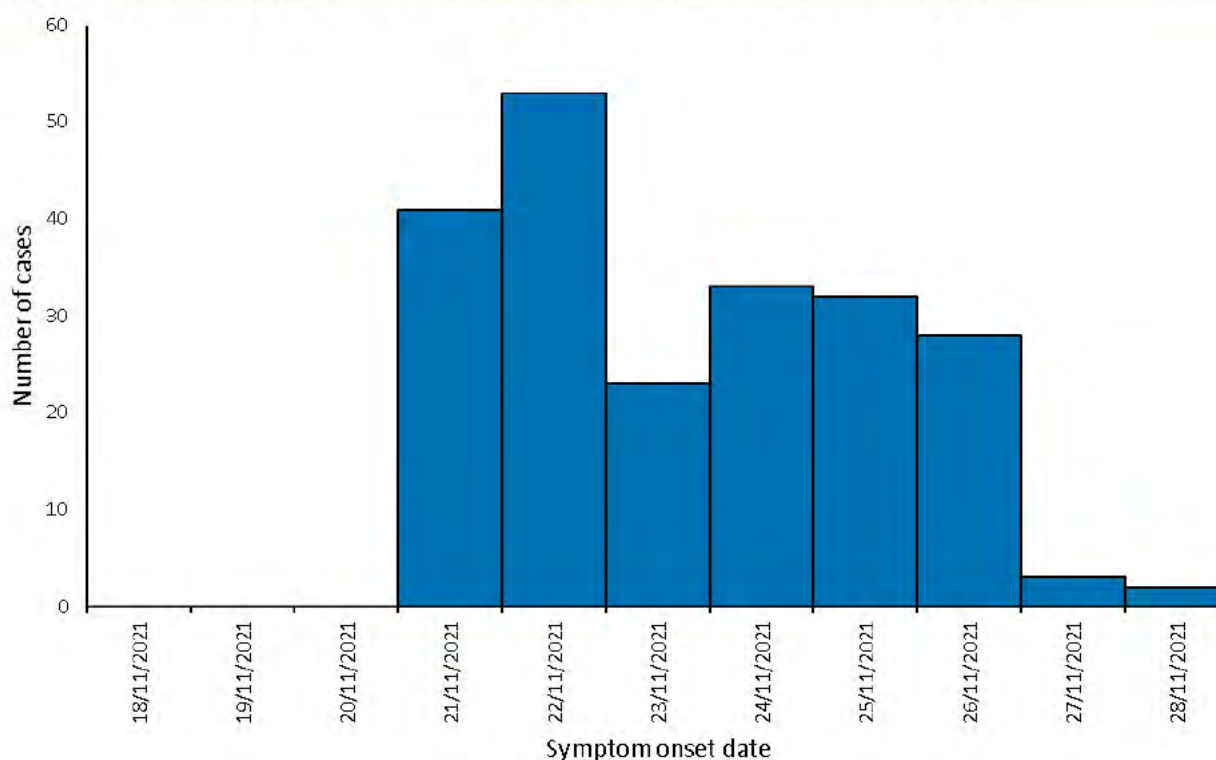
<i>Male</i>	103 (48%)	38 (44%)	141 (47%)
<i>Female</i>	112 (52%)	47 (55%)	159 (53%)
<i>Missing</i>	0 (0%)	1 (1%)	1 (<1%)
Age			
<i>0-19 years</i>	15 (7%)	8 (9%)	23 (8%)
<i>20-39 years</i>	130 (60%)	48 (56%)	178 (59%)
<i>40-59 years</i>	42 (20%)	16 (19%)	58 (19%)
<i>60 years +</i>	16 (7%)	2 (2%)	18 (6%)
<i>Missing</i>	12 (6%)	12 (14%)	24 (8%)

- All patrons (ill and not ill) ate a donut from the food premises bought between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive. Most patrons purchased a donut on 20 November (a Saturday, the busiest trading day for the food premises) or 24 November (a Wednesday with three work functions catered) (Table 2).

Table 2: Date of purchase by ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

Date of purchase	Ill N (%)	Not ill N (%)	Total
20/11/2021	84 (39%)	13 (15%)	97 (32%)
21/11/2021	39 (18%)	12 (14%)	51 (17%)
22/11/2021	14 (7%)	2 (2%)	16 (5%)
23/11/2021	29 (13%)	8 (9%)	37 (12%)
24/11/2021	48 (22%)	50 (86%)	98 (33%)
Missing	1 (<1%)	1 (1%)	2 (<1%)
Total	215 (100%)	86 (100%)	301 (100%)

- Most cases became unwell in the late hours of 21 November 2021 or the late hours of 22 November 2021 (Figure 1).
- Most respondents (n=195) purchased and ate as an individual purchase or in a small social group. 106 respondents ate as part of one of five defined cohorts (Table 3).

Figure 1: Onset of illness of respondents, Mrs Kim's Donuts outbreak, November 2021.**Table 3: Nested cohorts and attack rates , Mrs Kim's Donuts outbreak, November 2021.**

Cohort	Date of event		Total respondents	AR – respondents	
	Ill	Not Ill			
	20/11/2021	8	11	19	42.1%
	23/11/2021	11	4	15	72.7%
	23/11/2021	3	1	4	75%
	24/11/2021	5	4	9	55.6%
	24/11/2021	27	32	59	45.8%

Note: [Redacted] had 19 attendees, and [Redacted] had 140 attendees. The number of attendees for all other events is not known

- The main features of illness associated with this outbreak were:
 - median incubation period was 33.5 hours (range 6.27 – 138 hours, IQR 28.6-42.4 hours).
 - median duration of symptoms was 48 hours (range 3 – 174.5 hours, IQR 29.3-72 hours)
 - diarrhoea, vomiting and/or abdominal pain were the most common symptoms reported
 - one case was hospitalised as a result of their illness. This case had a short incubation period (6.26 hours). The discharge summary from hospital was reviewed and indicted they had previously had gastric sleeve surgery. This medical history was deemed a significant effect modifier, and the individual was included as a case.
 - this outbreak includes 8 likely cases of secondary transmission among household members. These 8 cases reported an incubation period of greater than 96 hours from eating a donut, and prior to their onset, at least one other member of their household was ill after consuming a donut.
- These data should be interpreted with caution due to do the low number of non-cases among respondents, the inability to employ active case finding in this outbreak, and the recall bias of respondents.

- A nested case-control study was undertaken in the largest defined cohort, the [REDACTED]

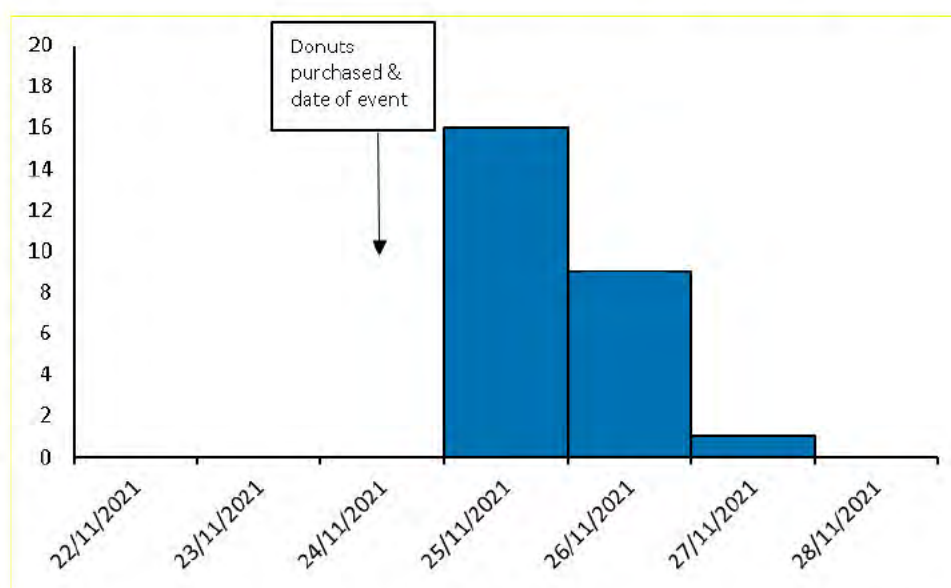
Case control study

- The [REDACTED] hosted a catered morning tea at 10:30hrs on 24 November 2021.
- The catering from Mrs Kim's Donuts contained a mixture of 192 donuts, including filled and unfilled donuts, purchased the morning of the event.
- No other foods were provided at this event, and no other catered/group meals were provided during the work week from 22 November to 26 November.
- 140 people attended the morning tea
- 59 attendees completed the survey
- Of the 59 attendees, 27 met the case definition. An additional 5 attendees reported a milder illness without vomiting or diarrhoea.
- The age and sex distribution of the [REDACTED] cohort is shown in Table 4.
- An epidemic curve of the [REDACTED] cohort is shown in Figure 2.

Table 4: Age and sex of ill and not-ill respondents, [REDACTED] outbreak, 24 November 2021.

	Ill	Not ill	Total
Total	27	32	59
Sex			
<i>Male</i>	103	38	39
<i>Female</i>	112	47	20
<i>Missing</i>	0	0	0
Age			
<i>0-19 years</i>	0	0	0
<i>20-39 years</i>	22	22	44
<i>40-59 years</i>	5	10	15
<i>60 years +</i>	0	0	0
<i>Missing</i>	0	0	0

Figure 2: Epidemic curve of the [REDACTED] outbreak, 24 November 2021.



- The main features of illness associated with the [REDACTED] cohort were:
 - The median incubation period was 35.1 hours (range 12.5-71.4 hours, IQR 31.3-45.2 hours)
 - The median illness duration was 38.8 hours (range 3.5-87 hours, IQR 22-66 hours)
- A summary of the attack rates by filling type and top donut flavours consumed is shown at Table 5.
- The only statistically significant association was found between eating any kind of filled donut and a person becoming unwell, however the confidence interval for this association is wide (OR:7.56, 95% CI: 1.22-200.61).

Table 5: Summary of attack rates and odds ratios for donuts, by filling type and the most commonly eating flavours, served at the [REDACTED] outbreak, 24 November 2021.

Donut eaten	Exposed				Unexposed				OR	95% CI
	Ill	Not Ill	Total	AR	Ill	Not Ill	Total	AR		
Any donut	27	32	59	45.8%	0	0	0	N/A	N/A	N/A
Donut filling type										
Any filled donut	26	24	50	52.0%	1	8	9	11.1%	7.56	1.22-200.61
Any cream/custard filled donut	15	16	31	48.4%	12	16	28	42.9%	1.24	0.44-3.56
Any caramel/jam/Nutella filled donut	7	8	15	46.7%	20	24	44	45.5%	1.05	0.31-3.50
Any unfilled donut	5	3	8	62.5%	22	29	51	43.1%	2.13	0.45-12.07
Most frequently consumed donut flavours										
Nutella^	4	5	9	44.4%	23	27	50	46.0%	0.95	0.20-4.13
Vanilla custard*	4	3	7	57.1%	23	29	52	44.2%	1.65	0.31-9.73
Dark chocolate mousse*	0	4	4	0.0%	27	28	55	49.1%	N/A	N/A
Crème Brûlée*	1	3	4	25.0%	26	27	53	49.1%	0.4	0.13-3.76
Salted caramel^	3	1	4	75.0%	24	31	55	43.6%	3.5	0.38-105.01
Cookies and cream*	2	2	4	50.0%	25	30	55	45.5%	1.2	0.12-12.18

Note: * have a cream/custard filling made at the food premises, ^have a pre-bought Nutella, salted caramel, or jam filling

Environmental Health Investigation

Initial site inspections – 25 November 2021

- An initial site inspection was conducted at 15:30 hrs on 25 November 2021. Prior to inspection, the proprietor had informed HPS there were no food samples on site.
- Staff have designated activities during preparation; with separate staff for baking such as dough preparation and frying, and for decorating, including custard or filling preparation, piping fillings, icing donuts.
- Dough making is kept separate from other activities in the premises in separate mixing bowls. Proofing and cooking of donuts are automated.
- Custard and cream fillings are made on site and do not contain eggs. Custard fillings are made in batches using sugar, milk, and custard powder, with purchased flavourings added.
- Flavourings are stored in tubs and used 'until empty', which was advised by staff as a 2-day period. Compliance with storage times was unconfirmed due to date labels missing from some storage containers.
- The food business uses reusable piping bags for fillings.
- Staff reported using tea towels to rest cooking utensils and for wiping hands.
- Staff reported serving donuts wearing gloves and using tongs.
- No food preparation nor serving staff have reported being unwell. The proprietor initially reported only two staff members worked at the business.
- At the initial site inspection, 10 environmental swabs were taken of surfaces, mixing equipment, and door handles.
- There was evidence of food preparation at the initial site inspection. A second inspection was conducted at 18:00 hrs to collect 6 food samples, 7 additional environmental swabs, and 1 piping bag.
- No cloths or tea towels were removed for sampling as none were present at the 18:00 hrs inspection.
- A Listeria clean was recommended by the Environmental Health team on 26 November 2021 as the pathogen was unknown.
- A review of the food grade cleaning sanitiser product indicated it was at similar levels to photographs taken at the initial registration inspection in July 2021.
- The proprietor was advised that they did not require clearance or approval from HPS to reopen, as the business had voluntarily closed.

Second site inspection

- A second site inspection was attempted on 29 November 2021. The proprietor indicated they were interstate.
- The proprietor was contacted by phone and reiterated only two staff had worked in the period of interest, and there were no customers unwell during this period.

Third site inspection

- A third site inspection was arranged for 1 December 2021. The proprietor initially accepted, and then declined.

- The proprietor was contacted by phone and reiterated only two staff had worked in the period of interest, and there were no customers unwell during this period.

Interview with proprietor

- An interview with staff was conducted onsite.
- Following reports from complainants of additional staff onsite, the proprietor revised their initial statement to indicate two additional staff had been working onsite during the study period in serving roles.
- The Environmental Health team provided an overview of norovirus infection and transmission pathways for this pathogen.

Laboratory Investigation

Food and environmental samples

- Samples collected from the food business were tested at the ACT Government Analytical Laboratories (ACTGAL).
- Environmental swabs, and the piping bag were tested for two primary pathogens:
 - 10 environmental samples and piping bag were tested for *Salmonella spp*
 - 7 environmental swabs were tested for *Listeria monocytogenes*
- The environmental swabs and piping bag returned negative results.
- Food samples were tested for *Salmonella*, *L. monocytogenes*, *E. coli*, standard plate count (SPC), *Clostridium perfringens*, *Staphylococcus aureus*, *Bacillus*, and coliforms (a hygiene indicator).
- Food samples were negative for the tested pathogens.
- Two food samples were positive for coliform:
 - Tiramisu filling – a custard-based filling prepared on site, coliform MPN (most probable number) per gram of 4.5
 - Cream filling – prepared on site, coliform MPN per gram of 920.0
- A sample of white chocolate icing recorded a SPC result of 33,000, which was considered an unusual result for an icing product. The interview with the food business found that the same scoop had repeatedly been used for the white chocolate buds and may provide a vehicle for contamination.
- The coliform results may be indicative of a hand hygiene, storage, or cleaning issue.
- Testing for norovirus in food and environmental samples is not able to be conducted by ACTGAL. ACTGAL investigated whether other laboratories could test food samples for norovirus, but no other Australian laboratories had an accredited testing method for a cream-based food matrix.

Human samples

- 11 stool specimens were collected from ill respondents.
 - Eight specimens were positive for norovirus. This included two specimens that initially returned negative norovirus antigen results when tested at private pathology but were PCR positive when tested at ACT Pathology.

- Two specimens were negative for norovirus, and all pathogens screened for in the laboratory tests. An additional specimen was collected, but had not requested norovirus testing, and was also negative for all pathogens screened for in the laboratory tests.
- One of the norovirus positive specimens was also positive for *Dientamoeba fragilis* and *Aeromonas* species.
 - The clinical significance and pathogenicity of *Dientamoeba fragilis* is unclear and is not considered to be a likely cause of illness.
 - *Aeromonas* species can be associated with diarrhoeal disease in humans but has also been reported as a common isolate among asymptomatic individuals. Contact with fresh or estuarine water is the most common source of infection, and this pathogen has not been associated with foodborne illness outbreaks in Australia¹.

Discussion

- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median illness duration of 48 hours. Fewer cases reported fever, and less than 10% of cases reported blood in stool.
- These features satisfy Lively's criteria² and are suggestive of norovirus infection. This pathogen typically has an incubation period of 10-50 hours (mean 24-48hrs) and symptom duration of 1-3 days. Symptoms of norovirus include abdominal cramps, diarrhoea, nausea, vomiting, and myalgia. Norovirus is highly infectious and is spread from the vomit or faeces of an infected person. Infection can occur from close person-to-person contact, consuming contaminated food or drink (often contaminated through poor food handling or poor hand washing), or contact with contaminated objects or surfaces (such as door and tap handles).
- Foodborne norovirus outbreaks have historically been associated with foods that have no kill step (i.e., uncooked) and/or are subject to lots of handling, such as salads. Donuts have not been identified as a vehicle previously.
- While all ill cases reported eating a donut, no single flavour or filling type was identified as the likely source of infection. This suggests widespread contamination of the donuts sold by the food business. The most likely source of norovirus contamination in this outbreak was an ill food handler, who contaminated donuts during the cooking, decoration, or serving processes over multiple days. No food handlers admitted to working while ill.
- There were no reports of vomiting or diarrhoeal episodes at the store, making it unlikely that environmental contamination was the mode of transmission.

Limitations

- The epidemiological study was subject to:
 - Selection bias from the sampling method and response bias
 - sampling method: this outbreak relied on illness being reported directly to ACT Health and snowballing among contacts. No active case finding was undertaken to seek out well patrons. These limitations may bias the data towards ill patrons and limits the internal validity and certainty in the epidemiological investigation.
 - response bias: the respondents in this outbreak likely bias towards ill patrons, who may be more motivated to complete an interview or survey than their non-ill counterparts.

- Measurement bias affected by the recall of participants, self-reporting, and change in data collection instruments. It is unclear if measurement bias has had a differential impact on ill or non-ill respondents, or
 - recall bias: interviews/surveys were conducted up to 21 days after purchasing the food product. This may affect a respondents recall of timing of events, duration of illness (if present), and memory of flavour/s consumed.
 - Self-reporting and misclassification: survey respondents self-reported symptom profile and dates and times of events without further clarification being sought that would occur in a phone interview (e.g., whether blood in stool or from another source, clarifying dates that appear contradictory). This may impact the quality of data collected.
 - interviewer bias: data collection was a mix of phone interviews and electronic surveys. Respondents to phone interviews may have been subject to differential levels of probing by different interviewers, compared with the survey where the questions were worded the same for all respondents. This may have affected the quality of data collected.

Conclusion

- At least 215 people had gastroenteritis after eating donuts purchased from Mrs Kim's Donuts Kingston between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive.
- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median symptom duration of 48 hours.
- The symptom profile of this outbreak satisfied Lively's criteria for norovirus and was supported by eight positive norovirus samples.
- All cases ate at least one donut. No single flavour or filling type was associated with illness.
- While the source of contamination was unable to be confirmed, it is suspected that a food handler worked while infectious and contaminated the donuts through the cooking, decoration and/or serving processes.
- This investigation highlights the potential for a foodborne illness outbreak in a food product not previously considered as a vehicle for norovirus.
- Future foodborne illness outbreaks should employ active case finding where possible to provide greater certainty in the investigation and its findings.
- Use of food home delivery service (i.e., [REDACTED], [REDACTED], [REDACTED]) records for investigation of foodborne outbreaks should be investigated.
- This outbreak was a single incident related to processing practices at the food business. No ongoing public health risk was identified.

Contact:	Keeley Allen
Position:	MAE Scholar
Phone:	5124 6215

Reference List

- ¹ Fernández-Bravo A, Figueras MJ. An update on the genus *Aeromonas*: taxonomy, epidemiology, and pathogenicity. *Microorganisms*. 2020 Jan;8(1):129.
- ² Lively JY, Johnson SD, Wikswo M, Gu W, Leon J, Hall AJ. Clinical and epidemiologic profiles for identifying norovirus in acute gastroenteritis outbreak investigations. In *Open forum infectious diseases* 2018 Apr (Vol. 5, No. 4, p. ofy049). US: Oxford University Press.

From: Allen, Keeley (Health)
Sent: Wednesday, 2 February 2022 09:54
To: Wansink, Victoria (Health)
Cc: Waters, Natasha (Health)
Subject: RE: Draft outbreak report for review - Mrs Kims Donuts

Hi Natasha and Vic,

Thank you for your edits and for being so speedy.

I'm waiting on feedback from EH and their availability put hopefully it will be in the coming weeks.

Best,
Keeley

From: Wansink, Victoria (Health) <Victoria.Wansink@act.gov.au>
Sent: Wednesday, 2 February 2022 9:08 AM
To: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>
Cc: Waters, Natasha (Health) <Natasha.Waters@act.gov.au>
Subject: RE: Draft outbreak report for review - Mrs Kims Donuts

Sorry Keeley,

Natasha just noticed I hadn't attached her edits....

My apologies!!

Dr Victoria Wansink (she/her) | Director Microbiology

Ph: 5124 9168 | Email: victoria.wansink@act.gov.au

ACT Government Analytical Laboratory, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate
Howard Florey Centenary House, Ngunnawal Country, 25 Mulley St, Holder ACT 2611
health.act.gov.au

I acknowledge the traditional custodians of the ACT, the Ngunnawal people. I acknowledge and respect their continuing culture and the contribution they make to the life of this city and this region.



From: Wansink, Victoria (Health)
Sent: Tuesday, 1 February 2022 7:06 PM
To: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>
Cc: Waters, Natasha (Health) <Natasha.Waters@act.gov.au>
Subject: RE: Draft outbreak report for review - Mrs Kims Donuts

Hi Keeley,

Natasha has done a thorough job of reviewing this from the Micro unit's perspective and I'm supportive of her suggested changes.

Of note, most of the edits are for better clarity and scientific accuracy around our results and how best to report them. "Negative" is not something that we can guarantee and the terminology of "not detected" or "not detected in x/g" is preferred. We can never guarantee that a food item or swabbed surface is completely free of the target organism. I'm sure you can understand this, and this is why we have suggested changes for these aspects.

Do you know if there's going to be an after action meeting for the outbreak once this report is finished?

Kind regards
Vic

Dr Victoria Wansink (she/her) | Director Microbiology

Ph: 5124 9168 | Email: victoria.wansink@act.gov.au

ACT Government Analytical Laboratory, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate
Howard Florey Centenary House, Ngunnawal Country, 25 Mulley St, Holder ACT 2611
health.act.gov.au

I acknowledge the traditional custodians of the ACT, the Ngunnawal people. I acknowledge and respect their continuing culture and the contribution they make to the life of this city and this region.



From: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>

Sent: Tuesday, 1 February 2022 9:50 AM

To: Hudson, Lyndell (Health) <Lyndell.Hudson@act.gov.au>; Mirza, Arif (Health) <Arif.Mirza@act.gov.au>; Wansink, Victoria (Health) <Victoria.Wansink@act.gov.au>; Waters, Natasha (Health) <Natasha.Waters@act.gov.au>

Cc: Pingault, Nevada (Health) <Nevada.Pingault@act.gov.au>

Subject: Draft outbreak report for review - Mrs Kims Donuts

Good morning team,

Disease Surveillance have put together a draft report for the Mrs Kims Donut outbreak (attached). We have added in some draft text for the environmental investigation and the laboratory investigation based on the ART minutes but would appreciate your review and feedback.

Please provide your feedback on the attached by Friday 11 February 2022. Let me know if you have any questions or concerns in the meantime.

Thank you in advance for all your help.

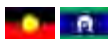
Best regards,
Keeley

Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate
25 Mulley St, Holder ACT 2611
health.act.gov.au





I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.



From: Allen, Keeley (Health)
Sent: Friday, 4 February 2022 10:27
To: Hudson, Lyndell (Health)
Cc: Pingault, Nevada (Health)
Subject: For review: Draft outbreak report - Mrs Kim's Donuts
Attachments: Draft Mrs Kim's Donuts Outbreak Summary report - 202201204.docx

Hi Lyndell,

Hope you're well.

I have attached the latest version of the Mrs Kim's Donuts outbreak report for EH review. I've added some notes on the EH inspection from the ART minutes, but I would love your input to ensure I have interpreted them correctly.

I was hoping to have a final report together by Friday 11 February. I was also hoping to schedule an after action meeting the week of 14 February if you are available.

Let me know if you have any questions in the meantime.

Best,
Keeley

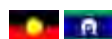
Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.





Health Protection Service

Howard Florey Centenary House, 25 Mulvey Street, Holder ACT 2611
 Locked Bag 5005, Weston Creek ACT 2611
 Phone: (02) 6205 1700 Fax: (02) 6205 1705
 Website: www.health.act.gov.au
 ABN: 88 407 290 295

OUTBREAK SUMMARY

Outbreak ID:	20210403		
Name of Institution:	Mrs Kim's Donuts		
Address:	9/15 Tench Street, Kingston ACT 2604		
Contact Person:		Phone:	
Email:		Fax:	
Date Notified:	25/11/2021	Date outbreak investigation commenced:	25/11/2021

Summary

- An outbreak of gastrointestinal illness affecting patrons of a donut shop in late November 2021 was investigated.
- Epidemiological, clinical, and environmental health investigations suggested the illness were caused by norovirus infection, following ingestion of donuts purchased from the food business between Saturday 20 November 2021 and Wednesday 24 November 2021, inclusive.
- A total of 215 ill patrons were identified.
- The source of infection was not able to be confirmed; however, the suspected source was an unwell [REDACTED] and a lapse in safe food handling procedures.

Initial notifications

The Health Protection Service (HPS) received several food poisoning complaints over a four-day period that related to this food business. These complaints included direct reports that named the business as the complainant's suspected source of illness, and indirect reports that initially implicated another food business where the complainant also ate from Mrs Kim's Donuts.

Direct notifications

- On Thursday 25 November, the proprietor of Mrs Kim's Donuts notified HPS at ACT Health Directorate of a food poisoning complaint regarding gastroenteritis symptoms in 11 people following consumption of donuts.
- The Disease Surveillance team interviewed each family group on the afternoon of Thursday 25 November 2021.
 - 11 people across four households reported illness. All households included at least one sick person.
 - 100% of the ill people ate a donut from Mrs Kim's Donuts purchased on 20 November 2021.
 - The median time from eating donuts to symptom onset in this group was 29 hours (range 24-48 hours) and median duration of illness for those whose illness had resolved by time of interview was 48 hours (range 42-54 hours).

- The most common symptoms reported in this group were diarrhoea, abdominal pain, and vomiting. No individuals reported blood in the stool.
- The households had not seen or eaten with each other in the week prior. The fourth household was also in quarantine for COVID-19 at the time of exposure and illness.
- Separately, the ACT Health Environmental Health customer service line received two separate food poisoning complaints on Thursday 25 November 2021 from patrons who ate food from Mrs Kim's Donuts on 20 November 2021 and 21 November 2021. These complainants and their contacts were interviewed by the Disease Surveillance team on Thursday 25 November 2021.

Indirect notifications

- HPS also investigated three separate food poisoning complaints that initially implicated other businesses, but investigation revealed the complainants also ate from Mrs Kim's Donuts.
 - ACT Health Environmental Health customer service line received a food poisoning complaint on Tuesday 23 November for a restaurant in Phillip. The complainant shared the meal among their household of 4 and 2 visiting family members.
 - All 6 family members reported becoming ill after eating from the restaurant on 20 November 2021, however no single food source was identified.
 - The Disease Surveillance Team reinterviewed the family on 29 November 2021 to confirm if any of the 6 had eaten a product from Mrs Kim's Donuts
 - The family confirmed they had eaten from Mrs Kim's Donuts 1.5 days before symptom onset.
 - On Friday 26 November, a team doctor for [REDACTED] contacted the Disease Surveillance team to report multiple sick team members following consumption of milkshakes from [REDACTED] Braddon at a team gathering.
 - The team doctor was reinterviewed on Monday 29 November 2021 and confirmed the team had also eaten donuts from Mrs Kim's Donuts.
 - All 19 team members were surveyed on Monday 29 November 2021.
 - On Tuesday 23 November, a complaint was received regarding two people becoming unwell after eating food from [REDACTED] Kingston. In their 3-day food history completed on Thursday 25 November, the complaint and their partner also mentioned eating Mrs Kim's Donuts the meal prior to [REDACTED].

Hypothesis

- The symptoms, duration and incubation period were suggestive of a viral infection, particularly norovirus.
- While all ill patrons reported eating a donut, no one flavour was identified at initial interview, suggesting that the source may have been due to a common ingredient, food handler and/or environmental contamination.

Case definition

A **case** in this outbreak is defined as:

A person who reported diarrhoea and/or vomiting to ACT Health following the consumption of a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021, inclusive.

A **non-case – mild illness** in this outbreak is defined as:

A person who reported at least one of abdominal pain, body aches/pains, headaches, and nausea after consuming a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021 inclusive.

A **non-case** in this outbreak was defined as:

A person who did not report gastrointestinal symptoms (diarrhoea and/or vomiting) after consuming a donut purchased from Mrs Kim's Donuts Kingston from Friday 19 November 2021 to Saturday 27 November 2021 inclusive.

Individuals were excluded from the analysis if:

- Time from consumption to illness onset was less than 6 hours, and no chronic gastrointestinal health conditions were reported,
- No food products were consumed from the food business,
- Food products were consumed earlier than Saturday 20 November 2021, or
- Food products were consumed later than Wednesday 24 November 2021

Epidemiological Investigation

- The investigation team was led by Keeley Allen (MAE Scholar), with assistance from Felicity Greenville (Public Health Nurse), Dr Nevada Pingault (Surveillance Manager), Alexandra Marmor (Surveillance Coordinator), Fotis Sgouros (Vaccine Data Entry Officer), Raleigh Evans (Vaccine Delivery Officer), and Algreg Gomez (MAE Scholar).
- Active case finding was not able to be undertaken for this outbreak because:
 - most orders were purchased by walk in customers.
 - check-In CBR data is strictly for the purpose of COVID-19 contact tracing.
 - The food business denied keeping order records.
 - obtaining order lists from [REDACTED] was proposed by the investigation team, however this was not approved by the Deputy CHO's office.
 - no media statements were released by ACT Health.
- Affected patrons did contact media outlets to complain about their illness, resulting in a number of news articles.
- This investigation relied on passive case finding by identifying contacts who shared donuts with complainants and responding to complaints made from the public in response to news items.
- Food poisoning complaints were diverted to the Disease Surveillance Team on Friday 26 December 2021 for an initial triage interview to confirm if the complaint was related to this outbreak. If the complaint was regarding another food business, the complainant was directed back to the Environmental Health team.
- Case questionnaires were completed using three methods:
 - Phone interviews – all complainants interviewed on 25 and November, who only provided a landline phone number, or required a translator had interviews conducted over the phone. Interview data was held in a REDCap instrument.
 - REDCap survey – a REDCap survey was implemented on Monday 29 November for complaints received from that date onwards. Complainants and their contacts who shared the meal were emailed or texted the link to a self-administered survey. A reminder was sent to complainants

if a response was not received one week after the first email from the Disease Surveillance team.

- REDCap cohort surveys – separate REDCap instruments were set up for defined cohorts that were identified from initial complaints. These cohorts included four work-related functions, and the [REDACTED]. The cohort surveys were self-administered and mirrored the general REDCap survey. One point of contact from each cohort was asked to distribute the surveys within their organisation.
- Interviews/surveys were conducted for ill and well patrons.
- The interviews/surveys collected information on symptoms, illness onset, illness duration, severity, foods eaten (including specific donut flavours), date purchased, dates eaten, and contact details of anyone who ate the product with the individuals. No fields were mandatory.
- 3-day food history questions were discontinued from Monday 29 January due to the volume of complaints received, and the increasing certainty of the food business as the source of infection.
- Interviews/surveys were conducted from Thursday 25 November 2021 to Friday 10 December 2021.
- The menu for 20 November to 24 November was requested from the food business, who stated they did not keep records of what flavours or volumes were sold on what days, and did not have a set menu, nor any patterns in what flavours were made on what days.
 - Menu items were identified from a menu posted on [REDACTED] and from initial case interviews.
- Donut flavours were categorised by filling type
 - Unfilled
 - Caramel/jam/Nutella filling – these were pre-bought fillings with no additional preparation by the food business
 - Cream/custard filling – these fillings were made on site by the food business.
- The investigation team determined that an analytical study could not be conducted for the overall outbreak as identifying sufficient controls was not possible through passive case finding.
 - A case-control study was conducted for the largest cohort within the outbreak, the [REDACTED]
- A line-list of respondents was created from the REDCap exports and analysed in Microsoft Excel and R.

Results

- The total number of patrons who consumed donuts in the study period was unknown.
- The Disease surveillance team interviewed or surveyed 301 individuals.
- 215 respondents met the case definition (71% of respondents).
- A further 16 cases reported a milder illness without vomiting and/or diarrhoea and did not meet the case definition.
- The sex and age group profiles of the ill and not-ill groups are shown in Table 1.

Table 1: Age and sex of ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

	Ill N (%)	Not ill N (%)	Total
Total	215 (71%)	86 (29%)	301
Sex			

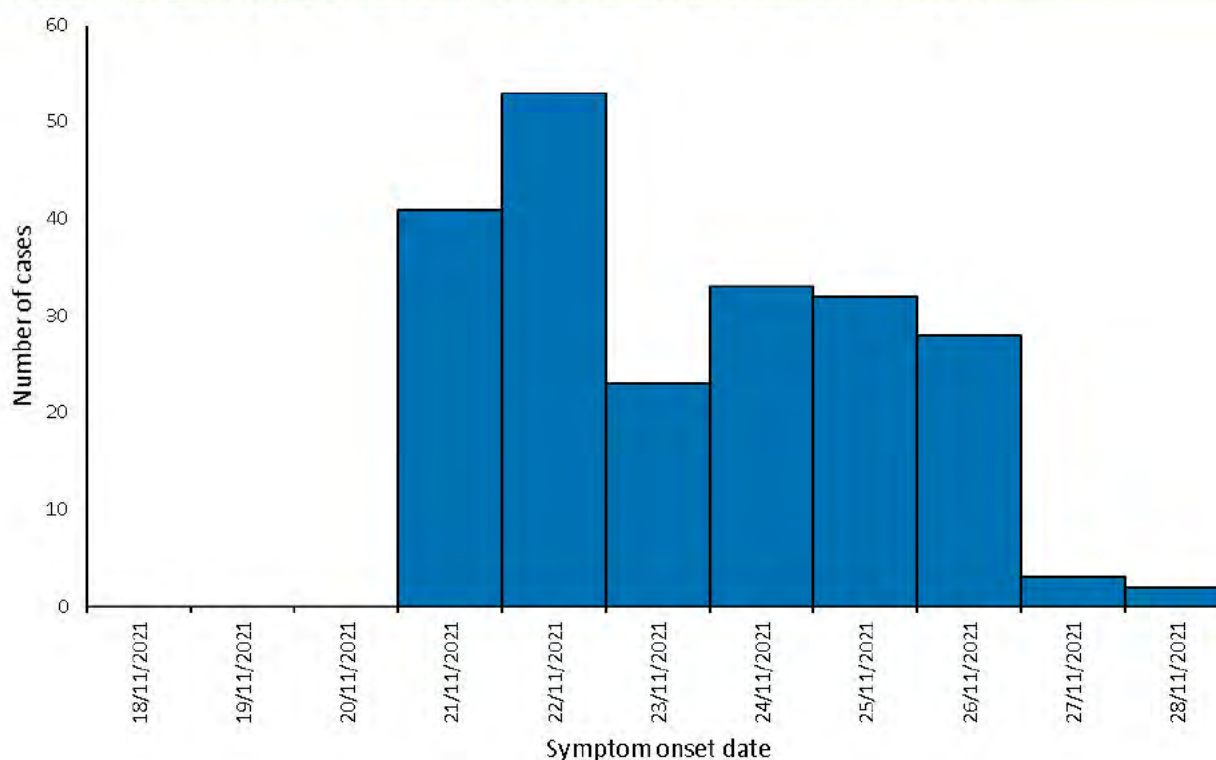
<i>Male</i>	103 (48%)	38 (44%)	141 (47%)
<i>Female</i>	112 (52%)	47 (55%)	159 (53%)
<i>Missing</i>	0 (0%)	1 (1%)	1 (<1%)
Age			
<i>0-19 years</i>	15 (7%)	8 (9%)	23 (8%)
<i>20-39 years</i>	130 (60%)	48 (56%)	178 (59%)
<i>40-59 years</i>	42 (20%)	16 (19%)	58 (19%)
<i>60 years +</i>	16 (7%)	2 (2%)	18 (6%)
<i>Missing</i>	12 (6%)	12 (14%)	24 (8%)

- All patrons (ill and not ill) ate a donut from the food premises bought between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive. Most patrons purchased a donut on 20 November (a Saturday, the busiest trading day for the food premises) or 24 November (a Wednesday with three work functions catered) (Table 2).

Table 2: Date of purchase by ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

Date of purchase	Ill N (%)	Not ill N (%)	Total
20/11/2021	84 (39%)	13 (15%)	97 (32%)
21/11/2021	39 (18%)	12 (14%)	51 (17%)
22/11/2021	14 (7%)	2 (2%)	16 (5%)
23/11/2021	29 (13%)	8 (9%)	37 (12%)
24/11/2021	48 (22%)	50 (86%)	98 (33%)
Missing	1 (<1%)	1 (1%)	2 (<1%)
Total	215 (100%)	86 (100%)	301 (100%)

- Most cases became unwell in the late hours of 21 November 2021 or the late hours of 22 November 2021 (Figure 1).
- Most respondents (n=195) purchased and ate as an individual purchase or in a small social group. 106 respondents ate as part of one of five defined cohorts (Table 3).

Figure 1: Onset of illness of respondents, Mrs Kim's Donuts outbreak, November 2021.**Table 3: Nested cohorts and attack rates, Mrs Kim's Donuts outbreak, November 2021.**

Cohort	Date of event		Total respondents	AR – respondents	
	Ill	Not Ill			
	20/11/2021	8	11	19	42.1%
	23/11/2021	11	4	15	72.7%
	23/11/2021	3	1	4	75%
	24/11/2021	5	4	9	55.6%
	24/11/2021	27	32	59	45.8%

Note: [Redacted] had 19 attendees, and [Redacted] had 140 attendees. The number of attendees for all other events is not known.

- The main features of illness associated with this outbreak were:
 - median incubation period was 33.5 hours (range 6.27 – 138 hours, IQR 28.6-42.4 hours).
 - median duration of symptoms was 48 hours (range 3 – 174.5 hours, IQR 29.3-72 hours)
 - diarrhoea, vomiting and/or abdominal pain were the most common symptoms reported
 - one case was hospitalised as a result of their illness. This case had a short incubation period (6.26 hours). The discharge summary from hospital was reviewed and indicted they had previously had gastric sleeve surgery. This medical history was deemed a significant effect modifier, and the individual was included as a case.
 - this outbreak includes 8 likely cases of secondary transmission among household members. These 8 cases reported an incubation period of greater than 96 hours from eating a donut, and prior to their onset, at least one other member of their household was ill after consuming a donut.
- These data should be interpreted with caution due to do the low number of non-cases among respondents, the inability to employ active case finding in this outbreak, and the recall bias of respondents.

- A nested case-control study was undertaken in the largest defined cohort, the [REDACTED]

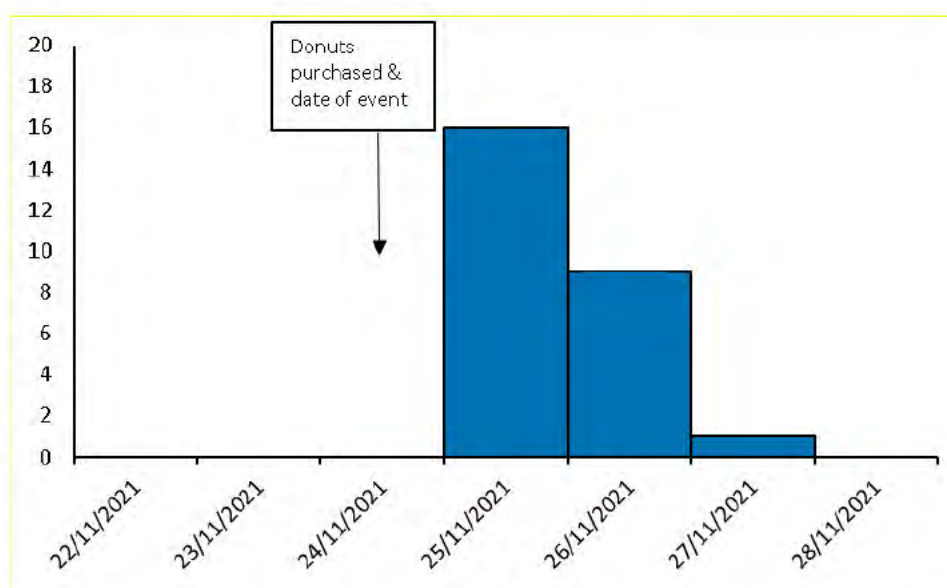
Case control study

- The [REDACTED] hosted a catered morning tea at 10:30hrs on 24 November 2021.
- The catering from Mrs Kim's Donuts contained a mixture of 192 donuts, including filled and unfilled donuts, purchased the morning of the event.
- No other foods were provided at this event, and no other catered/group meals were provided during the work week from 22 November to 26 November.
- 140 people attended the morning tea
- 59 attendees completed the survey
- Of the 59 attendees, 27 met the case definition. An additional 5 attendees reported a milder illness without vomiting or diarrhoea.
- The age and sex distribution of the [REDACTED] cohort is shown in Table 4.
- An epidemic curve of the [REDACTED] cohort is shown in Figure 2.

Table 4: Age and sex of ill and not-ill respondents, [REDACTED] outbreak, 24 November 2021.

	Ill	Not ill	Total
Total	27	32	59
<i>Sex</i>			
<i>Male</i>	103	38	39
<i>Female</i>	112	47	20
<i>Missing</i>	0	0	0
<i>Age</i>			
<i>0-19 years</i>	0	0	0
<i>20-39 years</i>	22	22	44
<i>40-59 years</i>	5	10	15
<i>60 years +</i>	0	0	0
<i>Missing</i>	0	0	0

Figure 2: Epidemic curve of the [REDACTED] outbreak, 24 November 2021.



- The main features of illness associated with the [REDACTED] cohort were:
 - The median incubation period was 35.1 hours (range 12.5-71.4 hours, IQR 31.3-45.2 hours)
 - The median illness duration was 38.8 hours (range 3.5-87 hours, IQR 22-66 hours)
- A summary of the attack rates by filling type and top donut flavours consumed is shown at Table 5.
- The only statistically significant association was found between eating any kind of filled donut and a person becoming unwell, however the confidence interval for this association is wide (OR:7.56, 95% CI: 1.22-200.61).

Table 5: Summary of attack rates and odds ratios for donuts, by filling type and the most commonly eating flavours, served at the [REDACTED] outbreak, 24 November 2021.

Donut eaten	Exposed				Unexposed				OR	95% CI
	Ill	Not Ill	Total	AR	Ill	Not Ill	Total	AR		
Any donut	27	32	59	45.8%	0	0	0	N/A	N/A	N/A
Donut filling type										
Any filled donut	26	24	50	52.0%	1	8	9	11.1%	7.56	1.22-200.61
Any cream/custard filled donut	15	16	31	48.4%	12	16	28	42.9%	1.24	0.44-3.56
Any caramel/jam/Nutella filled donut	7	8	15	46.7%	20	24	44	45.5%	1.05	0.31-3.50
Any unfilled donut	5	3	8	62.5%	22	29	51	43.1%	2.13	0.45-12.07
Most frequently consumed donut flavours										
Nutella [^]	4	5	9	44.4%	23	27	50	46.0%	0.95	0.20-4.13
Vanilla custard [*]	4	3	7	57.1%	23	29	52	44.2%	1.65	0.31-9.73
Dark chocolate mousse [*]	0	4	4	0.0%	27	28	55	49.1%	N/A	N/A
Crème Brûlée [*]	1	3	4	25.0%	26	27	53	49.1%	0.4	0.13-3.76
Salted caramel [^]	3	1	4	75.0%	24	31	55	43.6%	3.5	0.38-105.01
Cookies and cream [*]	2	2	4	50.0%	25	30	55	45.5%	1.2	0.12-12.18

Note: * have a cream/custard filling made at the food premises, [^]have a pre-bought Nutella, salted caramel, or jam filling

Environmental Health Investigation

Initial site inspections – 25 November 2021

- An initial site inspection was conducted at 15:30 hrs on 25 November 2021. Prior to inspection, the proprietor had informed HPS there were no food samples on site.
- Staff have designated activities during preparation; with separate staff for baking such as dough preparation and frying, and for decorating, including custard or filling preparation, piping fillings, icing donuts.
- Dough making is kept separate from other activities in the premises in separate mixing bowls. Proofing and cooking of donuts are automated.
- Custard and cream fillings are made on site and do not contain eggs. Custard fillings are made in batches using sugar, milk, and custard powder, with purchased flavourings added.
- Flavourings are stored in tubs and used 'until empty', which was advised by staff as a 2-day period. Compliance with storage times was unconfirmed due to date labels missing from some storage containers.
- The food business uses reusable piping bags for fillings.
- Staff reported using tea towels to rest cooking utensils and for wiping hands.
- Staff reported serving donuts wearing gloves and using tongs.
- No food preparation nor serving staff have reported being unwell. The proprietor initially reported only two staff members worked at the business.
- At the initial site inspection, 10 environmental swabs were taken of surfaces, mixing equipment, and door handles.
- There was evidence of food preparation at the initial site inspection. A second inspection was conducted at 18:00 hrs to collect 6 food samples, 7 additional environmental swabs, and 1 piping bag.
- No cloths or tea towels were removed for sampling as none were present at the 18:00 hrs inspection.
- A Listeria clean was recommended by the Environmental Health team on 26 November 2021 as the pathogen was unknown.
- A review of the food grade cleaning sanitiser product indicated it was at similar levels to photographs taken at the initial registration inspection in July 2021.
- The proprietor was advised that they did not require clearance or approval from HPS to reopen, as the business had voluntarily closed.

Second site inspection

- A second site inspection was attempted on 29 November 2021. The proprietor indicated they were interstate.
- The proprietor was contacted by phone and reiterated only two staff had worked in the period of interest, and there were no customers unwell during this period.

Third site inspection

- A third site inspection was arranged for 1 December 2021. The proprietor initially accepted, and then declined.

- The proprietor was contacted by phone and reiterated only two staff had worked in the period of interest, and there were no customers unwell during this period.

Interview with proprietor

- An interview with staff was conducted onsite.
- Following reports from complainants of additional staff onsite, the proprietor revised their initial statement to indicate two additional staff had been working onsite during the study period in serving roles.
- The Environmental Health team provided an overview of norovirus infection and transmission pathways for this pathogen.

Laboratory Investigation

Food and environmental samples

- Samples were collected from the food business on Thursday 25th of November and tested at the ACT Government Analytical Laboratories (ACTGAL).
- Environmental swabs, and the piping bag were tested for two primary pathogens:
 - 10 environmental samples were tested for *Salmonella* spp.
 - 7 environmental swabs and piping bag were tested for *Listeria monocytogenes*
- The environmental swabs and piping bag returned “Not Detected” results.
- 6 Food samples were tested for *Salmonella* spp., *L. monocytogenes*, *E. coli*, standard plate count (SPC), *Clostridium perfringens*, *Staphylococcus aureus*, *Bacillus cereus*, and coliforms (a hygiene indicator).
- All 6 Food samples returned the following results: . *Salmonella* spp. (Not Detected), *L. monocytogenes* (Not Detected), *E. coli* (<3 CFU/g), (<50 CFU), *Clostridium perfringens* (<5 CFU/g), *Staphylococcus aureus* (<50 CFU/g), *Bacillus cereus* (<50 CFU/g).
- Two of the 6 food samples returned results above detectable limits for coliforms:
 - Tiramisu filling – a custard-based filling prepared on site, coliform MPN (most probable number) per gram of 4.5
 - Cream filling – prepared on site, coliform MPN per gram of 920.0
 - The cream sample also returned a SPCV result of 920,000 CFU/g.
- A sample of white chocolate icing recorded a SPC result of 33,000 CFU/g, which was considered an unusual result for an icing product. The interview with the food business found that the same scoop had repeatedly been used for the white chocolate buds and may provide a vehicle for contamination.
- The coliform results may be indicative of a hand hygiene, storage, or cleaning issue.
- Testing for norovirus in food and environmental samples is not able to be conducted by ACTGAL. ACTGAL investigated whether other laboratories could test food samples for norovirus, but no other Australian laboratories had an accredited testing method for a cream-based food matrix.

Human samples

- 11 stool specimens were collected from ill respondents.

- Eight specimens were positive for norovirus. This included two specimens that initially returned negative norovirus antigen results when tested at private pathology but were PCR positive when tested at ACT Pathology.
- Two specimens were negative for norovirus, and all pathogens screened for in the laboratory tests. An additional specimen was collected, but had not requested norovirus testing, and was also negative for all pathogens screened for in the laboratory tests.
- One of the norovirus positive specimens was also positive for *Dientamoeba fragilis* and *Aeromonas* species.
 - The clinical significance and pathogenicity of *Dientamoeba fragilis* is unclear and is not considered to be a likely cause of illness.
 - *Aeromonas* species can be associated with diarrhoeal disease in humans but has also been reported as a common isolate among asymptomatic individuals. Contact with fresh or estuarine water is the most common source of infection, and this pathogen has not been associated with foodborne illness outbreaks in Australia¹.

Discussion

- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median illness duration of 48 hours. Fewer cases reported fever, and less than 10% of cases reported blood in stool.
- These features satisfy Lively's criteria² and are suggestive of norovirus infection. This pathogen typically has an incubation period of 10-50 hours (mean 24-48hrs) and symptom duration of 1-3 days. Symptoms of norovirus include abdominal cramps, diarrhoea, nausea, vomiting, and myalgia. Norovirus is highly infectious and is spread from the vomit or faeces of an infected person. Infection can occur from close person-to-person contact, consuming contaminated food or drink (often contaminated through poor food handling or poor hand washing), or contact with contaminated objects or surfaces (such as door and tap handles).
- Foodborne norovirus outbreaks have historically been associated with foods that have no kill step (i.e., uncooked) and/or are subject to lots of handling, such as salads. Donuts have not been identified as a vehicle previously.
- While all ill cases reported eating a donut, no single flavour or filling type was identified as the likely source of infection. This suggests widespread contamination of the donuts sold by the food business. The most likely source of norovirus contamination in this outbreak was an ill food handler, who contaminated donuts during the cooking, decoration, or serving processes over multiple days. No food handlers admitted to working while ill.
- There were no reports of vomiting or diarrhoeal episodes at the store, making it unlikely that environmental contamination was the mode of transmission.

Limitations

- The epidemiological study was subject to:
 - Selection bias from the sampling method and response bias
 - sampling method: this outbreak relied on illness being reported directly to ACT Health and snowballing among contacts. No active case finding was undertaken to seek out well

- patrons. These limitations may bias the data towards ill patrons and limits the internal validity and certainty in the epidemiological investigation.
- response bias: the respondents in this outbreak likely bias towards ill patrons, who may be more motivated to complete an interview or survey than their non-ill counterparts.
 - Measurement bias affected by the recall of participants, self-reporting, and change in data collection instruments. It is unclear if measurement bias has had a differential impact on ill or non-ill respondents, or
 - recall bias: interviews/surveys were conducted up to 21 days after purchasing the food product. This may affect a respondents recall of timing of events, duration of illness (if present), and memory of flavour/s consumed.
 - Self-reporting and misclassification: survey respondents self-reported symptom profile and dates and times of events without further clarification being sought that would occur in a phone interview (e.g., whether blood in stool or from another source, clarifying dates that appear contradictory). This may impact the quality of data collected.
 - interviewer bias: data collection was a mix of phone interviews and electronic surveys. Respondents to phone interviews may have been subject to differential levels of probing by different interviewers, compared with the survey where the questions were worded the same for all respondents. This may have affected the quality of data collected.

Conclusion

- At least 215 people had gastroenteritis after eating donuts purchased from Mrs Kim's Donuts Kingston between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive.
- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median symptom duration of 48 hours.
- The symptom profile of this outbreak satisfied Lively's criteria for norovirus and was supported by eight positive norovirus samples.
- All cases ate at least one donut. No single flavour or filling type was associated with illness.
- While the source of contamination was unable to be confirmed, it is suspected that a food handler worked while infectious and contaminated the donuts through the cooking, decoration and/or serving processes.
- This investigation highlights the potential for a foodborne illness outbreak in a food product not previously considered as a vehicle for norovirus.
- Future foodborne illness outbreaks should employ active case finding where possible to provide greater certainty in the investigation and its findings.
- Use of food home delivery service (i.e., [REDACTED], [REDACTED], [REDACTED]) records for investigation of foodborne outbreaks should be investigated.
- This outbreak was a single incident related to processing practices at the food business. No ongoing public health risk was identified.

Contact:	Keeley Allen
Position:	MAE Scholar

Phone:	5124 6215
--------	-----------

Reference List

¹ Fernández-Bravo A, Figueras MJ. An update on the genus *Aeromonas*: taxonomy, epidemiology, and pathogenicity. *Microorganisms*. 2020 Jan;8(1):129.

² Lively JY, Johnson SD, Wikswo M, Gu W, Leon J, Hall AJ. Clinical and epidemiologic profiles for identifying norovirus in acute gastroenteritis outbreak investigations. In *Open forum infectious diseases* 2018 Apr (Vol. 5, No. 4, p. ofy049). US: Oxford University Press.

From: Hudson, Lyndell (Health)
Sent: Tuesday, 8 February 2022 09:51
To: Allen, Keeley (Health)
Cc: Pingault, Nevada (Health)
Subject: RE: For review: Draft outbreak report - Mrs Kim's Donuts

Hi Keeley,

The after action meeting on the 14th works for me. My diary is up to date and free most of the day so far.

I hope to have the report back to you today, tomorrow at the latest.

Thanks
 Lyndell

From: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>
Sent: Friday, 4 February 2022 10:27 AM
To: Hudson, Lyndell (Health) <Lyndell.Hudson@act.gov.au>
Cc: Pingault, Nevada (Health) <Nevada.Pingault@act.gov.au>
Subject: For review: Draft outbreak report - Mrs Kim's Donuts

Hi Lyndell,

Hope you're well.

I have attached the latest version of the Mrs Kim's Donuts outbreak report for EH review. I've added some notes on the EH inspection from the ART minutes, but I would love your input to ensure I have interpreted them correctly.

I was hoping to have a final report together by Friday 11 February. I was also hoping to schedule an after action meeting the week of 14 February if you are available.

Let me know if you have any questions in the meantime.

Best,
 Keeley

Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.



From: Hudson, Lyndell (Health)
Sent: Wednesday, 9 February 2022 11:12 AM
To: Allen, Keeley (Health)
Cc: Pingault, Nevada (Health)
Subject: FW: For review: Draft outbreak report - Mrs Kim's Donuts
Attachments: Draft Mrs Kim's Donuts Outbreak Summary report - 202201204.docx

Hi Keeley,

Please find attached my input through track changes in the attached report.

Thanks for providing an opportunity to provide input.

Let me know if you have any questions.

Thanks
 Lyndell

From: Allen, Keeley (Health) <Keeley.Allen@act.gov.au>
Sent: Friday, 4 February 2022 10:27 AM
To: Hudson, Lyndell (Health) <Lyndell.Hudson@act.gov.au>
Cc: Pingault, Nevada (Health) <Nevada.Pingault@act.gov.au>
Subject: For review: Draft outbreak report - Mrs Kim's Donuts

Hi Lyndell,

Hope you're well.

I have attached the latest version of the Mrs Kim's Donuts outbreak report for EH review. I've added some notes on the EH inspection from the ART minutes, but I would love your input to ensure I have interpreted them correctly.

I was hoping to have a final report together by Friday 11 February. I was also hoping to schedule an after action meeting the week of 14 February if you are available.

Let me know if you have any questions in the meantime.

Best,
 Keeley

Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngannawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.





Health Protection Service

Howard Florey Centenary House, 25 Mulvey Street, Holder ACT 2611
 Locked Bag 5005, Weston Creek ACT 2611
 Phone: (02) 6205 1700 Fax: (02) 6205 1705
 Website: www.health.act.gov.au
 ABN: 88 407 290 295

OUTBREAK SUMMARY

Outbreak ID:	20210403		
Name of Institution:	Mrs Kim's Donuts		
Address:	9/15 Tench Street, Kingston ACT 2604		
Contact Person:		Phone:	
Email:		Fax:	
Date Notified:	25/11/2021	Date outbreak investigation commenced:	25/11/2021

Summary

- An outbreak of gastrointestinal illness affecting patrons of a donut shop in late November 2021 was investigated.
- Epidemiological, clinical, and environmental health investigations suggested the illness were caused by norovirus infection, following ingestion of donuts purchased from the food business between Saturday 20 November 2021 and Wednesday 24 November 2021, inclusive.
- A total of 215 ill patrons were identified.
- The source of infection was not able to be confirmed; however, the suspected source was an unwell [REDACTED] and a lapse in safe food handling procedures.

Initial notifications

The Health Protection Service (HPS) received several food poisoning complaints over a four-day period that related to this food business. These complaints included direct reports that named the business as the complainant's suspected source of illness, and indirect reports that initially implicated another food business where the complainant also ate from Mrs Kim's Donuts.

Direct notifications

- On Thursday 25 November, the proprietor of Mrs Kim's Donuts notified HPS at ACT Health Directorate of a food poisoning complaint regarding gastroenteritis symptoms in 11 people following consumption of donuts.
- The Disease Surveillance team interviewed each family group on the afternoon of Thursday 25 November 2021.
 - 11 people across four households reported illness. All households included at least one sick person.
 - 100% of the ill people ate a donut from Mrs Kim's Donuts purchased on 20 November 2021.
 - The median time from eating donuts to symptom onset in this group was 29 hours (range 24-48 hours) and median duration of illness for those whose illness had resolved by time of interview was 48 hours (range 42-54 hours).

- The most common symptoms reported in this group were diarrhoea, abdominal pain, and vomiting. No individuals reported blood in the stool.
- The households had not seen or eaten with each other in the week prior. The fourth household was also in quarantine for COVID-19 at the time of exposure and illness.
- Separately, the ACT Health Environmental Health Customer Service Officer received two separate food poisoning complaints on Thursday 25 November 2021 from patrons who ate food from Mrs Kim's Donuts on 20 November 2021 and 21 November 2021. These complainants and their contacts were interviewed by the Disease Surveillance team on Thursday 25 November 2021.

Indirect notifications

- HPS also investigated three separate food poisoning complaints that initially implicated other businesses, but investigation revealed the complainants also ate from Mrs Kim's Donuts.
 - ACT Health Environmental Health Customer Service Officer received a food poisoning complaint on Tuesday 23 November for a restaurant in Phillip. The complainant shared the meal among their household of 4 and 2 visiting family members.
 - All 6 family members reported becoming ill after eating from the restaurant on 20 November 2021, however no single food source was identified.
 - The Disease Surveillance Team reinterviewed the family on 29 November 2021 to confirm if any of the 6 had eaten a product from Mrs Kim's Donuts
 - The family confirmed they had eaten from Mrs Kim's Donuts 1.5 days before symptom onset.
 - On Friday 26 November, a team doctor for [REDACTED] contacted the Disease Surveillance team to report multiple sick team members following consumption of milkshakes from [REDACTED] Braddon at a team gathering.
 - The team doctor was reinterviewed on Monday 29 November 2021 and confirmed the team had also eaten donuts from Mrs Kim's Donuts.
 - All 19 team members were surveyed on Monday 29 November 2021.
 - On Tuesday 23 November, a complaint was received regarding two people becoming unwell after eating food from [REDACTED] Kingston. In their 3-day food history completed on Thursday 25 November, the complaint and their partner also mentioned eating Mrs Kim's Donuts the meal prior to [REDACTED].

Hypothesis

- The symptoms, duration and incubation period were suggestive of a viral infection, particularly norovirus.
- While all ill patrons reported eating a donut, no one flavour was identified at initial interview, suggesting that the source may have been due to a common ingredient, food handler and/or environmental contamination.

Case definition

A **case** in this outbreak is defined as:

A person who reported diarrhoea and/or vomiting to ACT Health following the consumption of a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021, inclusive.

A **non-case – mild illness** in this outbreak is defined as:

A person who reported at least one of abdominal pain, body aches/pains, headaches, and nausea after consuming a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021 inclusive.

A **non-case** in this outbreak was defined as:

A person who did not report gastrointestinal symptoms (diarrhoea and/or vomiting) after consuming a donut purchased from Mrs Kim's Donuts Kingston from Friday 19 November 2021 to Saturday 27 November 2021 inclusive.

Individuals were excluded from the analysis if:

- Time from consumption to illness onset was less than 6 hours, and no chronic gastrointestinal health conditions were reported,
- No food products were consumed from the food business,
- Food products were consumed earlier than Saturday 20 November 2021, or
- Food products were consumed later than Wednesday 24 November 2021

Epidemiological Investigation

- The investigation team was led by Keeley Allen (MAE Scholar), with assistance from Felicity Greenville (Public Health Nurse), Dr Nevada Pingault (Surveillance Manager), Alexandra Marmor (Surveillance Coordinator), Fotis Sgouros (Vaccine Data Entry Officer), Raleigh Evans (Vaccine Delivery Officer), and Algreg Gomez (MAE Scholar).
- Active case finding was not able to be undertaken for this outbreak because:
 - most orders were purchased by walk in customers.
 - check-In CBR data is strictly for the purpose of COVID-19 contact tracing.
 - The food business denied keeping order records.
 - obtaining order lists from Uber Eats was proposed by the investigation team, however this was not approved by the Deputy CHO's office.
 - no media statements, naming the business were released by ACT Health.
- Affected patrons did contact media outlets to complain about their illness, resulting in a number of news articles.
- This investigation relied on passive case finding by identifying contacts who shared donuts with complainants and responding to complaints made from the public in response to news items.
- Food poisoning complaints were diverted to the Disease Surveillance Team on Friday 26 November 2021 for an initial triage interview to confirm if the complaint was related to this outbreak. If the complaint was regarding another food business, the complainant was directed back to the Environmental Health team.
- Case questionnaires were completed using three methods:
 - Phone interviews – all complainants interviewed on 25 and XX November, who only provided a landline phone number, or required a translator had interviews conducted over the phone. Interview data was held in a REDCap instrument.
 - REDCap survey – a REDCap survey was implemented on Monday 29 November for complaints received from that date onwards. Complainants and their contacts who shared the meal were emailed or texted the link to a self-administered survey. A reminder was sent to complainants

if a response was not received one week after the first email from the Disease Surveillance team.

- REDCap cohort surveys – separate REDCap instruments were set up for defined cohorts that were identified from initial complaints. These cohorts included four work-related functions, and the Canberra United team. The cohort surveys were self-administered and mirrored the general REDCap survey. One point of contact from each cohort was asked to distribute the surveys within their organisation.
- Interviews/surveys were conducted for ill and well patrons.
- The interviews/surveys collected information on symptoms, illness onset, illness duration, severity, foods eaten (including specific donut flavours), date purchased, dates eaten, and contact details of anyone who ate the product with the individuals. No fields were mandatory.
- 3-day food history questions were discontinued from Monday 29 January due to the volume of complaints received, and the increasing certainty of the food business as the source of infection.
- Interviews/surveys were conducted from Thursday 25 November 2021 to Friday 10 December 2021.
- The menu for 20 November to 24 November was requested from the food business, who stated they did not keep records of what flavours or volumes were sold on what days, and did not have a set menu, nor any patterns in what flavours were made on what days.
 - Menu items were identified from a menu posted on [REDACTED] and from initial case interviews.
- Donut flavours were categorised by filling type
 - Unfilled
 - Caramel/jam/Nutella filling – these were pre-bought fillings with no additional preparation by the food business
 - Cream/custard filling – these fillings were made on site by the food business.
- The investigation team determined that an analytical study could not be conducted for the overall outbreak as identifying sufficient controls was not possible through passive case finding.
 - A case-control study was conducted for the largest cohort within the outbreak, the [REDACTED]
- A line-list of respondents was created from the REDCap exports and analysed in Microsoft Excel and R.

Results

- The total number of patrons who consumed donuts in the study period was unknown.
- The Disease surveillance team interviewed or surveyed 301 individuals.
- 215 respondents met the case definition (71% of respondents).
- A further 16 cases reported a milder illness without vomiting and/or diarrhoea and did not meet the case definition.
- The sex and age group profiles of the ill and not-ill groups are shown in Table 1.

Table 1: Age and sex of ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

	Ill N (%)	Not ill N (%)	Total
Total	215 (71%)	86 (29%)	301
Sex			

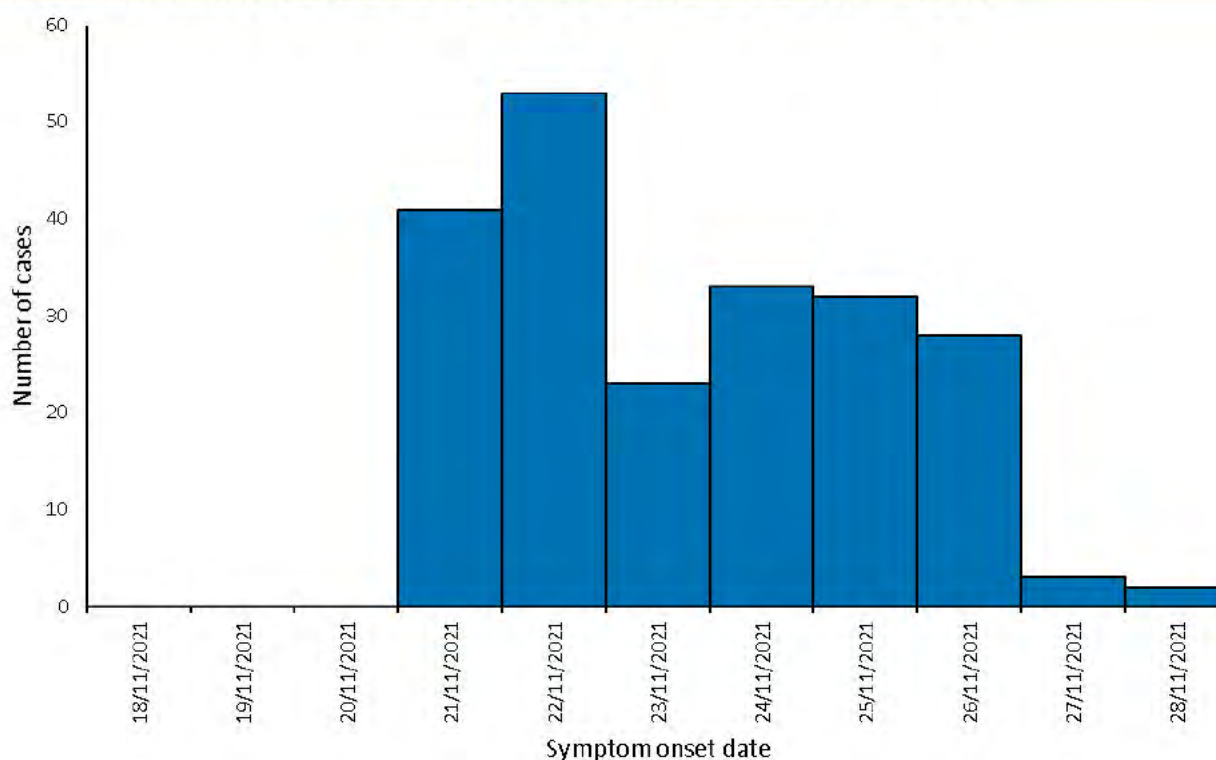
<i>Male</i>	103 (48%)	38 (44%)	141 (47%)
<i>Female</i>	112 (52%)	47 (55%)	159 (53%)
<i>Missing</i>	0 (0%)	1 (1%)	1 (<1%)
Age			
<i>0-19 years</i>	15 (7%)	8 (9%)	23 (8%)
<i>20-39 years</i>	130 (60%)	48 (56%)	178 (59%)
<i>40-59 years</i>	42 (20%)	16 (19%)	58 (19%)
<i>60 years +</i>	16 (7%)	2 (2%)	18 (6%)
<i>Missing</i>	12 (6%)	12 (14%)	24 (8%)

- All patrons (ill and not ill) ate a donut from the food premises bought between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive. Most patrons purchased a donut on 20 November (a Saturday, the busiest trading day for the food premises) or 24 November (a Wednesday with three work functions catered) (Table 2).

Table 2: Date of purchase by ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

Date of purchase	Ill N (%)	Not ill N (%)	Total
20/11/2021	84 (39%)	13 (15%)	97 (32%)
21/11/2021	39 (18%)	12 (14%)	51 (17%)
22/11/2021	14 (7%)	2 (2%)	16 (5%)
23/11/2021	29 (13%)	8 (9%)	37 (12%)
24/11/2021	48 (22%)	50 (86%)	98 (33%)
Missing	1 (<1%)	1 (1%)	2 (<1%)
Total	215 (100%)	86 (100%)	301 (100%)

- Most cases became unwell in the late hours of 21 November 2021 or the late hours of 22 November 2021 (Figure 1).
- Most respondents (n=195) purchased and ate as an individual purchase or in a small social group. 106 respondents ate as part of one of five defined cohorts (Table 3).

Figure 1: Onset of illness of respondents, Mrs Kim's Donuts outbreak, November 2021.**Table 3: Nested cohorts and attack rates , Mrs Kim's Donuts outbreak, November 2021.**

Cohort	Date of event		Total respondents	AR – respondents	
	Ill	Not Ill			
	20/11/2021	8	11	19	42.1%
	23/11/2021	11	4	15	72.7%
	23/11/2021	3	1	4	75%
	24/11/2021	5	4	9	55.6%
	24/11/2021	27	32	59	45.8%

Note: [Redacted] had 19 attendees, and [Redacted] had 140 attendees. The number of attendees for all other events is not known

- The main features of illness associated with this outbreak were:
 - median incubation period was 33.5 hours (range 6.27 – 138 hours, IQR 28.6-42.4 hours).
 - median duration of symptoms was 48 hours (range 3 – 174.5 hours, IQR 29.3-72 hours)
 - diarrhoea, vomiting and/or abdominal pain were the most common symptoms reported
 - one case was hospitalised as a result of their illness. This case had a short incubation period (6.26 hours). The discharge summary from hospital was reviewed and indicted they had previously had gastric sleeve surgery. This medical history was deemed a significant effect modifier, and the individual was included as a case.
 - this outbreak includes 8 likely cases of secondary transmission among household members. These 8 cases reported an incubation period of greater than 96 hours from eating a donut, and prior to their onset, at least one other member of their household was ill after consuming a donut.
- These data should be interpreted with caution due to the low number of non-cases among respondents, the inability to employ active case finding in this outbreak, and the recall bias of respondents.

- A nested case-control study was undertaken in the largest defined cohort, the [REDACTED]

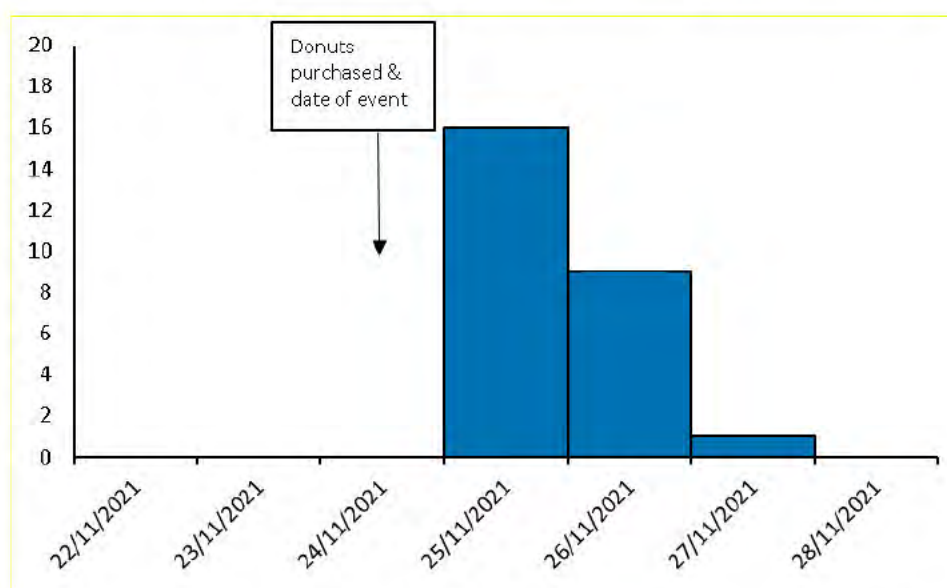
Case control study

- The [REDACTED] hosted a catered morning tea at 10:30hrs on 24 November 2021.
- The catering from Mrs Kim's Donuts contained a mixture of 192 donuts, including filled and unfilled donuts, purchased the morning of the event.
- No other foods were provided at this event, and no other catered/group meals were provided during the work week from 22 November to 26 November.
- 140 people attended the morning tea
- 59 attendees completed the survey
- Of the 59 attendees, 27 met the case definition. An additional 5 attendees reported a milder illness without vomiting or diarrhoea.
- The age and sex distribution of the [REDACTED] cohort is shown in Table 4.
- An epidemic curve of the [REDACTED] cohort is shown in Figure 2.

Table 4: Age and sex of ill and not-ill respondents, [REDACTED] outbreak, 24 November 2021.

	Ill	Not ill	Total
Total	27	32	59
Sex			
<i>Male</i>	103	38	39
<i>Female</i>	112	47	20
<i>Missing</i>	0	0	0
Age			
<i>0-19 years</i>	0	0	0
<i>20-39 years</i>	22	22	44
<i>40-59 years</i>	5	10	15
<i>60 years +</i>	0	0	0
<i>Missing</i>	0	0	0

Figure 2: Epidemic curve of the [REDACTED] outbreak, 24 November 2021.



- The main features of illness associated with the [REDACTED] cohort were:
 - The median incubation period was 35.1 hours (range 12.5-71.4 hours, IQR 31.3-45.2 hours)
 - The median illness duration was 38.8 hours (range 3.5-87 hours, IQR 22-66 hours)
- A summary of the attack rates by filling type and top donut flavours consumed is shown at Table 5.
- The only statistically significant association was found between eating any kind of filled donut and a person becoming unwell, however the confidence interval for this association is wide (OR:7.56, 95% CI: 1.22-200.61).

Table 5: Summary of attack rates and odds ratios for donuts, by filling type and the most commonly eating flavours, served at the [REDACTED] outbreak, 24 November 2021.

Donut eaten	Exposed				Unexposed				OR	95% CI
	Ill	Not Ill	Total	AR	Ill	Not Ill	Total	AR		
Any donut	27	32	59	45.8%	0	0	0	N/A	N/A	N/A
Donut filling type										
Any filled donut	26	24	50	52.0%	1	8	9	11.1%	7.56	1.22-200.61
Any cream/custard filled donut	15	16	31	48.4%	12	16	28	42.9%	1.24	0.44-3.56
Any caramel/jam/Nutella filled donut	7	8	15	46.7%	20	24	44	45.5%	1.05	0.31-3.50
Any unfilled donut	5	3	8	62.5%	22	29	51	43.1%	2.13	0.45-12.07
Most frequently consumed donut flavours										
Nutella^	4	5	9	44.4%	23	27	50	46.0%	0.95	0.20-4.13
Vanilla custard*	4	3	7	57.1%	23	29	52	44.2%	1.65	0.31-9.73
Dark chocolate mousse*	0	4	4	0.0%	27	28	55	49.1%	N/A	N/A
Crème Brûlée*	1	3	4	25.0%	26	27	53	49.1%	0.4	0.13-3.76
Salted caramel^	3	1	4	75.0%	24	31	55	43.6%	3.5	0.38-105.01
Cookies and cream*	2	2	4	50.0%	25	30	55	45.5%	1.2	0.12-12.18

Note: * have a cream/custard filling made at the food premises, ^have a pre-bought Nutella, salted caramel, or jam filling

Environmental Health Investigation

Initial food safety inspections – 25 November 2021

- A food safety inspection was conducted at 15:30 hrs on 25 November 2021. Prior to inspection, the proprietor had informed HPS there were no food samples on site as they had disposed of all products following customer complaints regarding illness.
- Food Handlers have designated activities during preparation; with separate staff for baking such as dough preparation and frying, and for decorating, including custard or filling preparation, piping fillings, icing donuts.
- Dough making is kept separate from other activities in the premises in separate mixing bowls. Proofing and cooking of donuts are automated.
- Custard and cream fillings are made on site and do not contain egg. Custard fillings are made in batches using sugar, milk, and custard powder, with purchased flavourings added.
- Flavourings are stored in tubs and used 'until empty', which is approximately a 2-day period. Compliance with storage times was unconfirmed due to date labels missing from some storage containers.
- The food business uses reusable piping bags for fillings.
- Food handlers reported using tea towels to rest cooking utensils and for wiping hands.
- Food Handlers reported serving donuts wearing gloves and using tongs.
- There were no reports of staff illness. The proprietor reported only two staff members worked at the business.
- During the inspection, 10 environmental swabs were collected from surfaces, mixing equipment, and door handles.
- A follow up inspection was conducted at 18:00 hrs to collect additional samples including 6 food samples, 7 additional environmental swabs, and 1 piping bag.
- No cloths or tea towels were available for sampling.
- A deep clean using bleach was recommended by the Environmental Health team on 26 November 2021 as the pathogen was unknown.
- A review of the food grade sanitiser at the premises indicated it was the original product and content that was photographed at the initial registration inspection in July 2021.
- The proprietor requested clearance from ACT Health to reopen the premises. The proprietor advised that as the businesses had voluntarily closed they did not require clearance or approval to reopen.

29 November 2021

- A onsite visit was attempted on 29 November 2021 however the proprietor advised via phone that he was interstate.
- The proprietor reiterated only two staff had worked in the period of interest, and there were no reports of illness from staff or customers being unwell during this period.

Formal Interview Invite

- The proprietor was invited to a formal interview on 1 December 2021 at the Offices of the Health Protection Service. The proprietor initially accepted however following local media reports the interview was declined.
- The proprietor again reiterated only two staff had worked in the period of interest and that both had been well. The proprietor also confirmed there were no incidents of customers being unwell at the premises.

Interview with proprietor

- On 6 December 2021, an interview with the proprietor and the proprietor's [REDACTED] (food handler) was conducted onsite to obtain additional information, discuss the suspected cause of the outbreak and confirm the cleaning and sanitising of the premises.
- Following reports from complainants of additional food handlers (front of house staff), the proprietor confirmed two additional staff had been working at the premises during 20 November 2021 and Wednesday 24 November 2021.
- Advice was provided regarding norovirus infection, the suspected cause of the outbreak, and transmission pathways.

Laboratory Investigation

Food and environmental samples

- Samples were collected from the food business on Thursday 25th of November and tested at the ACT Government Analytical Laboratories (ACTGAL).
- Environmental swabs, and the piping bag were tested for two primary pathogens:
 - 10 environmental samples were tested for *Salmonella* spp.
 - 7 environmental swabs and piping bag were tested for *Listeria monocytogenes*
- The environmental swabs and piping bag returned "Not Detected" results.
- 6 Food samples were tested for *Salmonella* spp., *L. monocytogenes*, *E. coli*, standard plate count (SPC), *Clostridium perfringens*, *Staphylococcus aureus*, *Bacillus cereus*, and coliforms (a hygiene indicator).
- All 6 Food samples returned the following results: *Salmonella* spp. (Not Detected), *L. monocytogenes* (Not Detected), *E. coli* (<3 CFU/g), (*E. coli* <50 CFU), *Clostridium perfringens* (<5 CFU/g), *Staphylococcus aureus* (<50 CFU/g), *Bacillus cereus* (<50 CFU/g).
- Two of the 6 food samples returned results above detectable limits for coliforms:
 - Tiramisu filling – a custard-based filling prepared on site, coliform MPN (most probable number) per gram of 4.5
 - Cream filling – prepared on site, coliform MPN per gram of 920.0
 - The cream sample also returned a SPCV result of 920,000 CFU/g.
- A sample of white chocolate icing recorded a SPC result of 33,000 CFU/g, which was considered an unusual result for an icing product. The interview with the proprietor found that the same scoop had repeatedly been used for the white chocolate buds. The scoops was also stored within the product and may provide a vehicle for contamination.
- The coliform results may be indicative of a hand hygiene, storage, or cleaning issue.

- Testing for norovirus in food and environmental samples is not able to be conducted by ACTGAL. ACTGAL investigated whether other laboratories could test food samples for norovirus, but no other Australian laboratories had an accredited testing method for a cream-based food matrix.

Human samples

- 11 stool specimens were collected from ill respondents.
 - Eight specimens were positive for norovirus. This included two specimens that initially returned negative norovirus antigen results when tested at private pathology but were PCR positive when tested at ACT Pathology.
 - Two specimens were negative for norovirus, and all pathogens screened for in the laboratory tests. An additional specimen was collected, but had not requested norovirus testing, and was also negative for all pathogens screened for in the laboratory tests.
 - One of the norovirus positive specimens was also positive for *Dientamoeba fragilis* and *Aeromonas* species.
 - The clinical significance and pathogenicity of *Dientamoeba fragilis* is unclear and is not considered to be a likely cause of illness.
 - *Aeromonas* species can be associated with diarrhoeal disease in humans but has also been reported as a common isolate among asymptomatic individuals. Contact with fresh or estuarine water is the most common source of infection, and this pathogen has not been associated with foodborne illness outbreaks in Australia¹.

Discussion

- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median illness duration of 48 hours. Fewer cases reported fever, and less than 10% of cases reported blood in stool.
- These features satisfy Lively's criteria² and are suggestive of norovirus infection. This pathogen typically has an incubation period of 10-50 hours (mean 24-48hrs) and symptom duration of 1-3 days. Symptoms of norovirus include abdominal cramps, diarrhoea, nausea, vomiting, and myalgia. Norovirus is highly infectious and is spread from the vomit or faeces of an infected person. Infection can occur from close person-to-person contact, consuming contaminated food or drink (often contaminated through poor food handling or poor hand washing), or contact with contaminated objects or surfaces (such as door and tap handles).
- Foodborne norovirus outbreaks have historically been associated with foods that have no kill step (i.e., uncooked) and/or are subject to lots of handling, such as salads. Donuts have not been identified as a vehicle previously.
- While all ill cases reported eating a donut, no single flavour or filling type was identified as the likely source of infection. This suggests widespread contamination of the donuts sold by the food business. The most likely source of norovirus contamination in this outbreak was an ill food handler, who contaminated donuts during the cooking, decoration, or serving processes over multiple days. No food handlers admitted to working while ill.
- There were no reports of vomiting or diarrhoeal episodes at the store, making it unlikely that environmental contamination was the mode of transmission.

Limitations

- The epidemiological study was subject to:
 - Selection bias from the sampling method and response bias
 - sampling method: this outbreak relied on illness being reported directly to ACT Health and snowballing among contacts. No active case finding was undertaken to seek out well patrons. These limitations may bias the data towards ill patrons and limits the internal validity and certainty in the epidemiological investigation.
 - response bias: the respondents in this outbreak likely bias towards ill patrons, who may be more motivated to complete an interview or survey than their non-ill counterparts.
 - Measurement bias affected by the recall of participants, self-reporting, and change in data collection instruments. It is unclear if measurement bias has had a differential impact on ill or non-ill respondents, or
 - recall bias: interviews/surveys were conducted up to 21 days after purchasing the food product. This may affect a respondents recall of timing of events, duration of illness (if present), and memory of flavour/s consumed.
 - Self-reporting and misclassification: survey respondents self-reported symptom profile and dates and times of events without further clarification being sought that would occur in a phone interview (e.g., whether blood in stool or from another source, clarifying dates that appear contradictory). This may impact the quality of data collected.
 - interviewer bias: data collection was a mix of phone interviews and electronic surveys. Respondents to phone interviews may have been subject to differential levels of probing by different interviewers, compared with the survey where the questions were worded the same for all respondents. This may have affected the quality of data collected.

Conclusion

- At least 215 people had gastroenteritis after eating donuts purchased from Mrs Kim's Donuts Kingston between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive.
- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median symptom duration of 48 hours.
- The symptom profile of this outbreak satisfied Lively's criteria for norovirus and was supported by eight positive norovirus samples.
- All cases ate at least one donut. No single flavour or filling type was associated with illness.
- While the source of contamination was unable to be confirmed, it is suspected that a food handler worked while infectious and contaminated the donuts through the cooking, decoration and/or serving processes.
- This investigation highlights the potential for a foodborne illness outbreak in a food product not previously considered as a vehicle for norovirus.
- Future foodborne illness outbreaks should employ active case finding where possible to provide greater certainty in the investigation and its findings.
- Use of food home delivery service (i.e., [REDACTED], [REDACTED], [REDACTED]) records for investigation of foodborne outbreaks should be investigated.
- This outbreak was a single incident related to processing practices at the food business. No ongoing public health risk was identified.

Contact:	Keeley Allen
Position:	MAE Scholar
Phone:	5124 6215

Reference List

¹ Fernández-Bravo A, Figueras MJ. An update on the genus *Aeromonas*: taxonomy, epidemiology, and pathogenicity. *Microorganisms*. 2020 Jan;8(1):129.

² Lively JY, Johnson SD, Wikswo M, Gu W, Leon J, Hall AJ. Clinical and epidemiologic profiles for identifying norovirus in acute gastroenteritis outbreak investigations. In *Open forum infectious diseases* 2018 Apr (Vol. 5, No. 4, p. ofy049). US: Oxford University Press.

CRMS Event 210003142 (Closed)

11-Feb-2022 at 09:42:58 AM

Description

Alleged Food Poisoning Complaint

Mrs Kim's Donuts - Kingston

On 25/11/21 the proprietor, [REDACTED], contacted us regarding two calls he had received regarding people who had purchased his donuts and fallen ill. At the time he had been advised it was four people and he provided us with the contact numbers he had been given. Additional phone calls started coming in and it was handed to Arif Mirza to begin investigating.

Initial phone call details from the proprietor are:

[REDACTED] - [REDACTED] and he didn't catch their name but their number was [REDACTED]

Requestor

[REDACTED]

Class

External

On Behalf Of**Urgency**

Normal

Requestor's Address**Contact Details****Mob:** [REDACTED]**Coordinator**

Radomir Krsteski

Action Officer

Arif Mirza

CategoryFood Poisoning - Food
Poisoning Outbreak**Org1**

Health Protection Service

Source

Telephone

Org2

Environmental Health

Type

Complaint

Org3Environmental Health
Operations**Recorded**

07-Dec-2021

Target

12-Dec-2021

Issue LocationMrs Kim's Donuts - 9/15 Tench
Street, KINGSTON ACT 2604**Property Details****Contacts****Type****Name****Contact Details****Address**

Requested By

[REDACTED]

[REDACTED]

Comments

Recorded Date	Recorded By	Title	Description
10-Feb-2022	Arif Mirza	Event Closure Comment	Closed. Documents attached to HM and TRIM.
09-Feb-2022	Arif Mirza	Notes	Please see attached documents for review, inspection report, photos and correspondences. Food poisoning outbreak was investigated. The source of infection was not able to be confirmed; however, the suspected source could be an unwell food handler and may have contaminated food during handling. 8 confirmed cases of norovirus was reported. In total 215 reported gastro symptoms which was identified closely with norovirus as per epidemiologist. Food samples were also taken from the premises to look for other sources of contaminations. Cream sample had border marginal results for SPC and high coliform count. This was discussed with the business in an onsite meeting and provided education on hygiene and temperature control and process improvements.

Actions

Recorded Date	Action Officer	Status	Description
09-Feb-2022	Verity Jennings	Complete	QA Review

Latest Information

Recorded Date	Recorded By	Type	Description
10-Feb-2022	Arif Mirza	Referred to Coordinator Radomir Krsteski on Close Event	
10-Feb-2022	Arif Mirza	Referred to Action Officer Arif Mirza on Close Event	
10-Feb-2022	Arif Mirza	Comment	Event Closure Comment
10-Feb-2022	Arif Mirza	Event Closed	Closed. Documents attached to HM and TRIM.
09-Feb-2022	Arif Mirza	Action #14770744 has been allocated to you. Type: QA Review Target: 11/02/2022 12:00:00 AM Description: QA Review	
09-Feb-2022	Arif Mirza	Action	QA Review - Action created on 9/02/2022 3:57:17 PM
09-Feb-2022	Arif Mirza	Comment	Notes
09-Feb-2022	Arif Mirza	Document	Chain of Custody forms
09-Feb-2022	Arif Mirza	Document	Statutory sample receipt
09-Feb-2022	Arif Mirza	Document	Food and swab sample receipts & food sample payment receipt
09-Feb-2022	Arif Mirza	Document	Inspection photos 25.11.2021
09-Feb-2022	Arif Mirza	Document	Inspection photos 25.11.2021
09-Feb-2022	Arif Mirza	Document	Correspondences with Business
13-Dec-2021	Arif Mirza	Event Recategorised	Food Poisoning - Food Poisoning Outbreak
07-Dec-2021	Nicki Norbart	Referred to Action Officer Arif Mirza on	

Subject: After action meeting: Mrs Kim's Donuts
Location: ACTHealth-HPS-Holder Meeting 2; ACTHealth-HPS-Holder Meeting 3
Start: Mon 14/02/2022 2:00 PM
End: Mon 14/02/2022 3:00 PM
Show Time As: Tentative
Recurrence: (none)
Meeting Status: Not yet responded
Organizer: Allen, Keeley (Health)
Required Attendees: Greenville, Felicity (Health); Pingault, Nevada (Health); Hudson, Lyndell (Health); Mirza, Arif (Health); Waters, Natasha (Health); Wansink, Victoria (Health); Post, Jenny (Health)
Optional Attendees: Gomez, Algreg (Health)
Resources: ACTHealth-HPS-Holder Meeting 2; ACTHealth-HPS-Holder Meeting 3

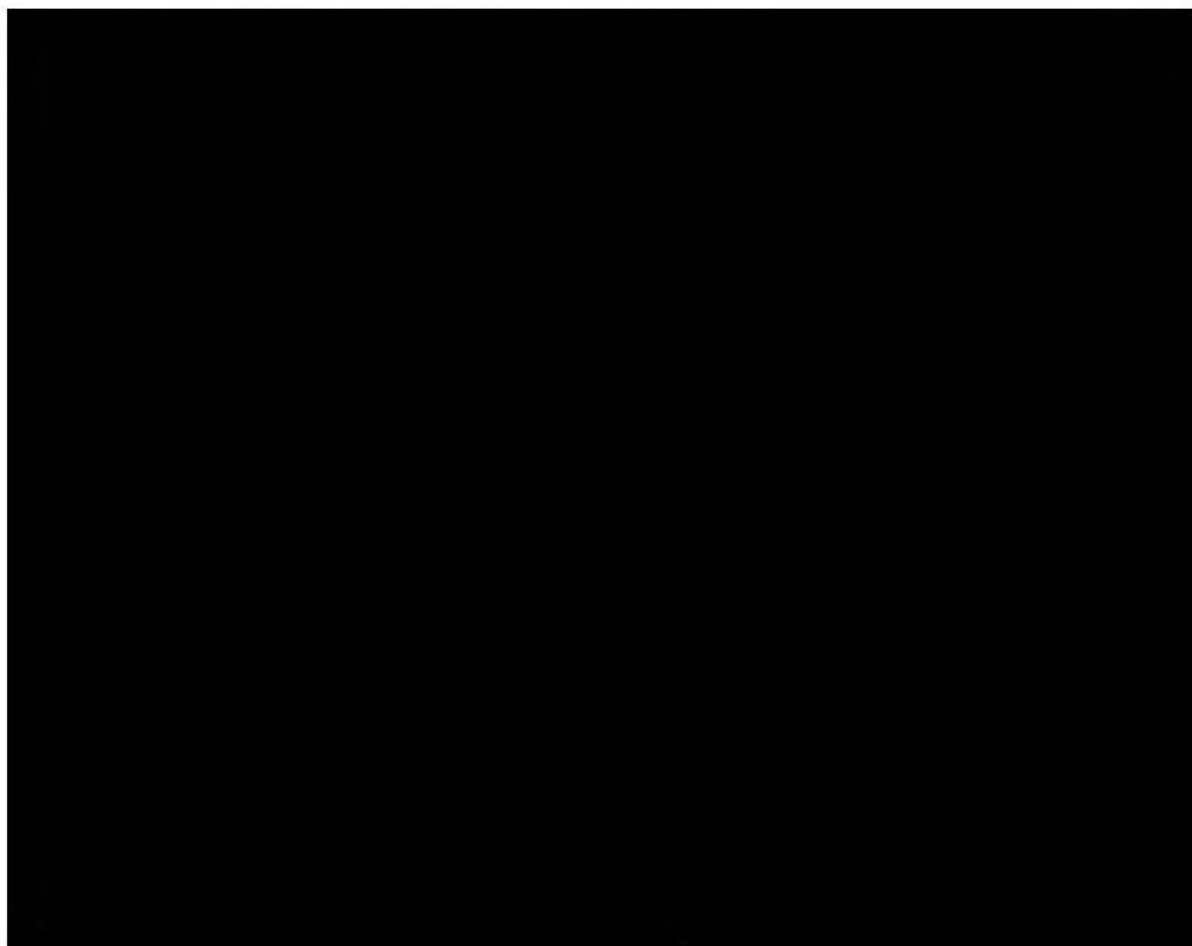
Hi team,

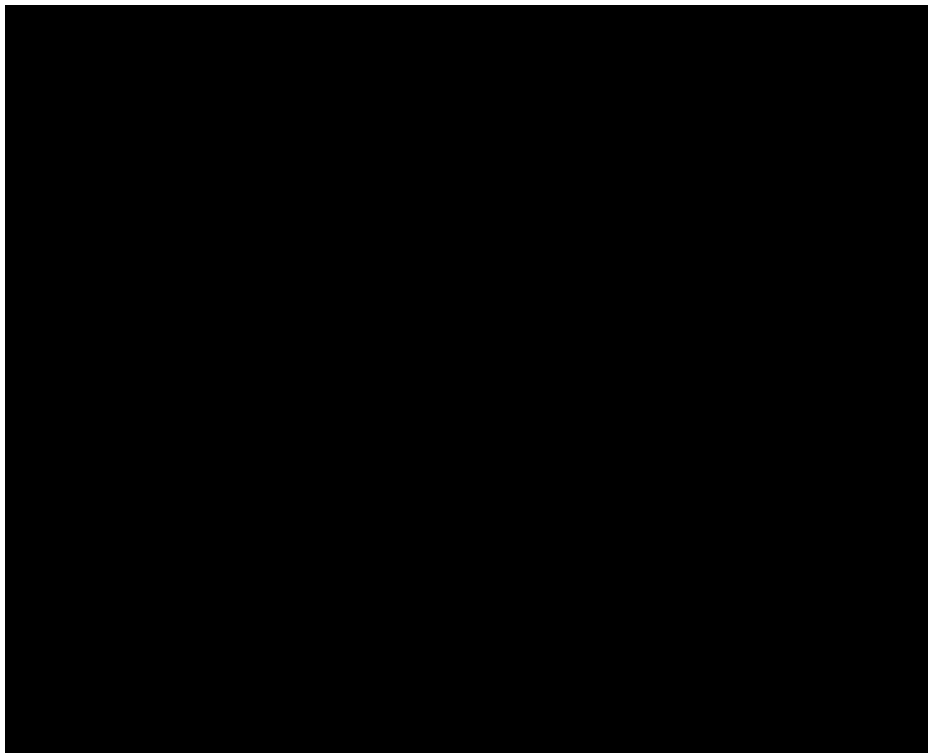
The purpose of this meeting is to have an after action debrief for the Mrs Kim's Donuts outbreak. I have also invited our new OzFoodNet Epidemiologist, Jenny Post, for an introduction to our fabulous team.

I have set this up as a Webex meeting, let me know if that does not work for you.

Best,
Keeley

-- Do not delete or change any of the following text. --







Health Protection Service

Howard Florey Centenary House, 25 Mulley Street, Holder ACT 2611
 Locked Bag 5005, Weston Creek ACT 2611
 Phone: (02) 6205 1700 Fax: (02) 6205 1705
 Website: www.health.act.gov.au
 ABN: 88 407 290 295

OUTBREAK SUMMARY

Outbreak ID:	20210403		
Name of Institution:	Mrs Kim's Donuts		
Address:	9/15 Tench Street, Kingston ACT 2604		
Date Notified:	25/11/2021	Date outbreak investigation commenced:	25/11/2021

Summary

- An outbreak of gastrointestinal illness affecting patrons of a donut shop in late November 2021 was investigated.
- Epidemiological, clinical, and environmental health investigations suggested the illness were caused by norovirus infection, following ingestion of donuts purchased from the food business between Saturday 20 November 2021 and Wednesday 24 November 2021, inclusive.
- A total of 215 ill patrons were identified.
- The source of infection was not able to be confirmed; however, the suspected source was an unwell [REDACTED] and a lapse in safe food handling procedures.

Initial notifications

The Health Protection Service (HPS) received several food poisoning complaints over a four-day period that related to this food business. These complaints included direct reports that named the business as the complainant's suspected source of illness, and indirect reports that initially implicated another food business where the complainant also ate from Mrs Kim's Donuts.

Direct notifications

- On Thursday 25 November, the proprietor of Mrs Kim's Donuts notified HPS at ACT Health Directorate of a food poisoning complaint regarding gastroenteritis symptoms in 11 people following consumption of donuts.
- The Disease Surveillance team interviewed each family group on the afternoon of Thursday 25 November 2021.
 - 11 people across four households reported illness. All households included at least one sick person.
 - 100% of the ill people ate a donut from Mrs Kim's Donuts purchased on 20 November 2021.
 - The median time from eating donuts to symptom onset in this group was 29 hours (range 24-48 hours) and median duration of illness for those whose illness had resolved by time of interview was 48 hours (range 42-54 hours).
 - The most common symptoms reported in this group were diarrhoea, abdominal pain, and vomiting. No individuals reported blood in the stool.

- The households had not seen or eaten with each other in the week prior. The fourth household was also in quarantine for COVID-19 at the time of exposure and illness.
- Separately, the ACT Health Environmental Health Customer Service Officer received two separate food poisoning complaints on Thursday 25 November 2021 from patrons who ate food from Mrs Kim's Donuts on 20 November 2021 and 21 November 2021. These complainants and their contacts were interviewed by the Disease Surveillance team on Thursday 25 November 2021.

Indirect notifications

- HPS also investigated three separate food poisoning complaints that initially implicated other businesses, but investigation revealed the complainants also ate from Mrs Kim's Donuts.
 - ACT Health Environmental Health Customer Service Officer received a food poisoning complaint on Tuesday 23 November for a restaurant in Phillip. The complainant shared the meal among their household of 4 and 2 visiting family members.
 - All 6 family members reported becoming ill after eating from the restaurant on 20 November 2021, however no single food source was identified.
 - The Disease Surveillance Team reinterviewed the family on 29 November 2021 to confirm if any of the 6 had eaten a product from Mrs Kim's Donuts
 - The family confirmed they had eaten from Mrs Kim's Donuts 1.5 days before symptom onset.
 - On Friday 26 November, a team doctor for [REDACTED] contacted the Disease Surveillance team to report multiple sick team members following consumption of milkshakes from [REDACTED] Braddon at a team gathering.
 - The team doctor was reinterviewed on Monday 29 November 2021 and confirmed the team had also eaten donuts from Mrs Kim's Donuts.
 - All 19 team members were surveyed on Monday 29 November 2021.
 - On Tuesday 23 November, a complaint was received regarding two people becoming unwell after eating food from [REDACTED] Kingston. In their 3-day food history completed on Thursday 25 November, the complaint and their partner also mentioned eating Mrs Kim's Donuts the meal prior to [REDACTED].

Hypothesis

- The symptoms, duration and incubation period were suggestive of a viral infection, particularly norovirus.
- While all ill patrons reported eating a donut, no one flavour was identified at initial interview, suggesting that the source may have been due to a common ingredient, food handler and/or environmental contamination.

Case definition

A **case** in this outbreak is defined as:

A person who reported diarrhoea and/or vomiting to ACT Health following the consumption of a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021, inclusive.

A **non-case – mild illness** in this outbreak is defined as:

A person who reported at least one of abdominal pain, body aches/pains, headaches, and nausea after consuming a donut purchased from Mrs Kim's Donuts Kingston from Saturday 20 November 2021 to Wednesday 24 November 2021 inclusive.

A **non-case** in this outbreak was defined as:

A person who did not report gastrointestinal symptoms (diarrhoea and/or vomiting) after consuming a donut purchased from Mrs Kim's Donuts Kingston from Friday 19 November 2021 to Saturday 27 November 2021 inclusive.

Individuals were excluded from the analysis if:

- Time from consumption to illness onset was less than 6 hours, and no chronic gastrointestinal health conditions were reported,
- No food products were consumed from the food business,
- Food products were consumed earlier than Saturday 20 November 2021, or
- Food products were consumed later than Wednesday 24 November 2021

Epidemiological Investigation

- The investigation team was led by Keeley Allen (MAE Scholar), with assistance from Felicity Greenville (Public Health Nurse), Dr Nevada Pingault (Surveillance Manager), Alexandra Marmor (Surveillance Coordinator), Fotis Sgouros (Vaccine Data Entry Officer), Raleigh Evans (Vaccine Delivery Officer), and Algreg Gomez (MAE Scholar).
- Active case finding was not able to be undertaken for this outbreak because:
 - most orders were purchased by walk in customers.
 - check-In CBR data is strictly for the purpose of COVID-19 contact tracing.
 - The food business denied keeping order records.
 - obtaining order lists from [REDACTED] was proposed by the investigation team, however this was not approved by the Deputy CHO's office.
 - no media statements were released by ACT Health.
- Affected patrons did contact media outlets to complain about their illness, resulting in a number of news articles.
- This investigation relied on passive case finding by identifying contacts who shared donuts with complainants and responding to complaints made from the public in response to news items.
- Food poisoning complaints were diverted to the Disease Surveillance Team on Friday 26 November 2021 for an initial triage interview to confirm if the complaint was related to this outbreak. If the complaint was regarding another food business, the complainant was directed back to the Environmental Health team.
- Case questionnaires were completed using three methods:
 - Phone interviews – all complainants interviewed on 25 and 26 November, who only provided a landline phone number, or required a translator had interviews conducted over the phone. Interview data was held in a REDCap instrument.
 - REDCap survey – a REDCap survey was implemented on Monday 29 November for complaints received from that date onwards. Complainants and their contacts who shared the meal were emailed or texted the link to a self-administered survey. A reminder was sent to complainants if a response was not received one week after the first email from the Disease Surveillance team.

- REDCap cohort surveys – separate REDCap instruments were set up for defined cohorts that were identified from initial complaints. These cohorts included four work-related functions, and the [REDACTED]. The cohort surveys were self-administered and mirrored the general REDCap survey. One point of contact from each cohort was asked to distribute the surveys within their organisation.
- Interviews/surveys were conducted for ill and well patrons.
- The interviews/surveys collected information on symptoms, illness onset, illness duration, severity, foods eaten (including specific donut flavours), date purchased, dates eaten, and contact details of anyone who ate the product with the individuals. No fields were mandatory.
- 3-day food history questions were discontinued from Monday 29 November due to the volume of complaints received, and the increasing certainty of the food business as the source of infection.
- Interviews/surveys were conducted from Thursday 25 November 2021 to Friday 10 December 2021.
- The menu for 20 November to 24 November was requested from the food business, who stated they did not keep records of what flavours or volumes were sold on what days, and did not have a set menu, nor any patterns in what flavours were made on what days.
 - Menu items were identified from a menu posted on [REDACTED], and from initial case interviews.
- Donut flavours were categorised by filling type
 - Unfilled
 - Caramel/jam/Nutella filling – these were pre-bought fillings with no additional preparation by the food business
 - Cream/custard filling – these fillings were made on site by the food business.
- The investigation team determined that an analytical study could not be conducted for the overall outbreak as identifying sufficient controls was not possible through passive case finding.
 - A case-control study was conducted for the largest cohort within the outbreak, the [REDACTED].
- A line-list of respondents was created from the REDCap exports and analysed in Microsoft Excel and R.

Results

- The total number of patrons who consumed donuts in the study period was unknown.
- The Disease surveillance team interviewed or surveyed 301 individuals.
- 215 respondents met the case definition (71% of respondents).
- A further 16 cases reported a milder illness without vomiting and/or diarrhoea and did not meet the case definition.
- The sex and age group profiles of the ill and not-ill groups are shown in Table 1.

Table 1: Age and sex of ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

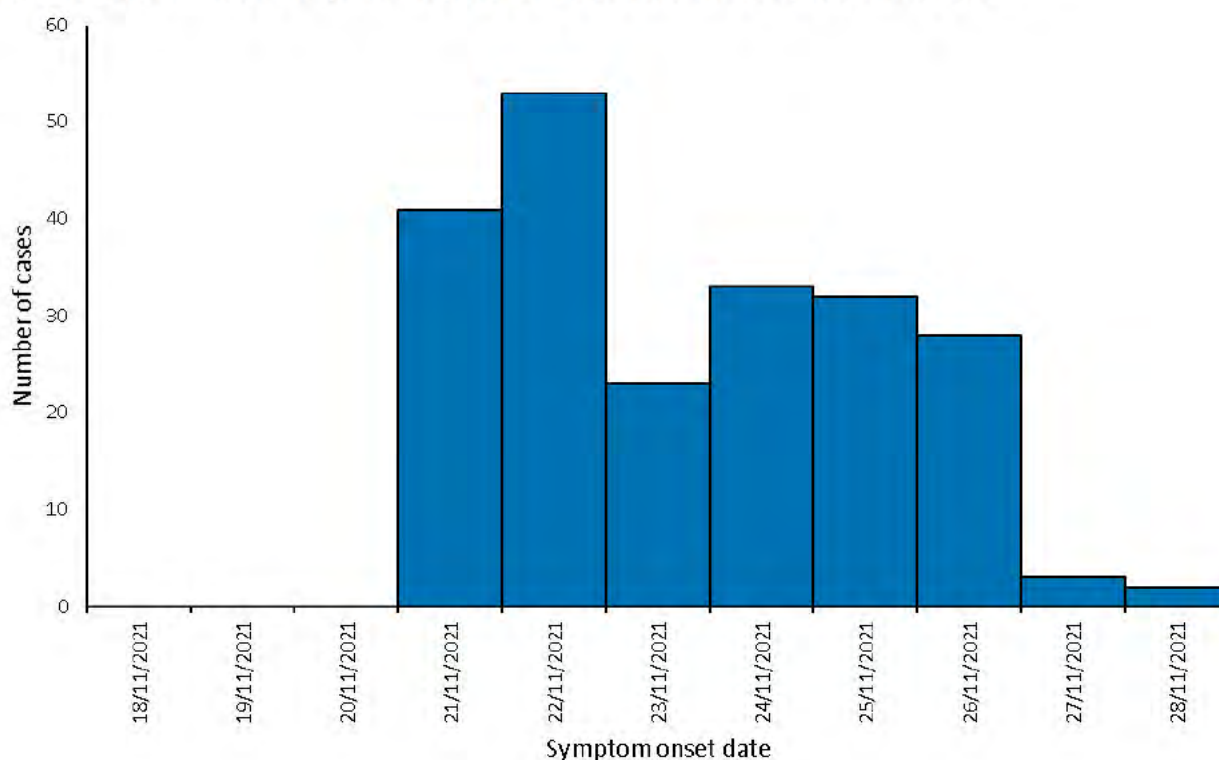
	Ill N (%)	Not ill N (%)	Total
Total	215 (71%)	86 (29%)	301 (100%)
<i>Sex</i>			
<i>Male</i>	103 (48%)	38 (44%)	141 (47%)
<i>Female</i>	112 (52%)	47 (55%)	159 (53%)
<i>Missing</i>	0 (0%)	1 (1%)	1 (<1%)
<i>Age</i>			
<i>0-19 years</i>	15 (7%)	8 (9%)	23 (8%)
<i>20-39 years</i>	130 (60%)	48 (56%)	178 (59%)
<i>40-59 years</i>	42 (20%)	16 (19%)	58 (19%)
<i>60 years +</i>	16 (7%)	2 (2%)	18 (6%)
<i>Missing</i>	12 (6%)	12 (14%)	24 (8%)

- All patrons (ill and not ill) ate a donut from the food premises bought between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive. Most patrons purchased a donut on 20 November (a Saturday, the busiest trading day for the food premises) or 24 November (a Wednesday with three work functions catered) (Table 2).

Table 2: Date of purchase by ill and not-ill respondents, Mrs Kim's Donuts outbreak, November 2021.

Date of purchase	Ill N (%)	Not ill N (%)	Total
20/11/2021	84 (39%)	13 (15%)	97 (32%)
21/11/2021	39 (18%)	12 (14%)	51 (17%)
22/11/2021	14 (7%)	2 (2%)	16 (5%)
23/11/2021	29 (13%)	8 (9%)	37 (12%)
24/11/2021	48 (22%)	50 (86%)	98 (33%)
Missing	1 (<1%)	1 (1%)	2 (<1%)
Total	215 (100%)	86 (100%)	301 (100%)

- Most cases became unwell in the late hours of 21 November 2021 or the late hours of 22 November 2021 (Figure 1).
- Most respondents (n=195) purchased and ate as an individual purchase or in a small social group. 106 respondents ate as part of one of five defined cohorts (Table 3).

Figure 1: Onset of illness of respondents, Mrs Kim's Donuts outbreak, November 2021.**Table 3: Nested cohorts and attack rates , Mrs Kim's Donuts outbreak, November 2021.**

Cohort	Date of event		Total respondents	AR – respondents	
	Ill	Not Ill			
	20/11/2021	8	11	19	42.1%
	23/11/2021	11	4	15	72.7%
	23/11/2021	3	1	4	75%
	24/11/2021	5	4	9	55.6%
	24/11/2021	27	32	59	45.8%

Note: [Redacted] had 19 attendees, and [Redacted] had 140 attendees. The number of attendees for all other events is not known

- The main features of illness associated with this outbreak were:
 - median incubation period was 33.5 hours (range 6.27 – 138 hours, IQR 28.6-42.4 hours).
 - median duration of symptoms was 48 hours (range 3 – 174.5 hours, IQR 29.3-72 hours)
 - diarrhoea, vomiting and/or abdominal pain were the most common symptoms reported
 - one case was hospitalised as a result of their illness. This case had a short incubation period (6.26 hours). The discharge summary from hospital was reviewed and indicated they had previously had gastric sleeve surgery. This medical history was deemed a significant effect modifier, and the individual was included as a case.
 - this outbreak includes 8 likely cases of secondary transmission among household members. These 8 cases reported an incubation period of greater than 96 hours from eating a donut, and prior to their onset, at least one other member of their household was ill after consuming a donut.
- These data should be interpreted with caution due to the low number of non-cases among respondents, the inability to employ active case finding in this outbreak, and the recall bias of respondents.
- A nested case-control study was undertaken in the largest defined cohort, the [Redacted]

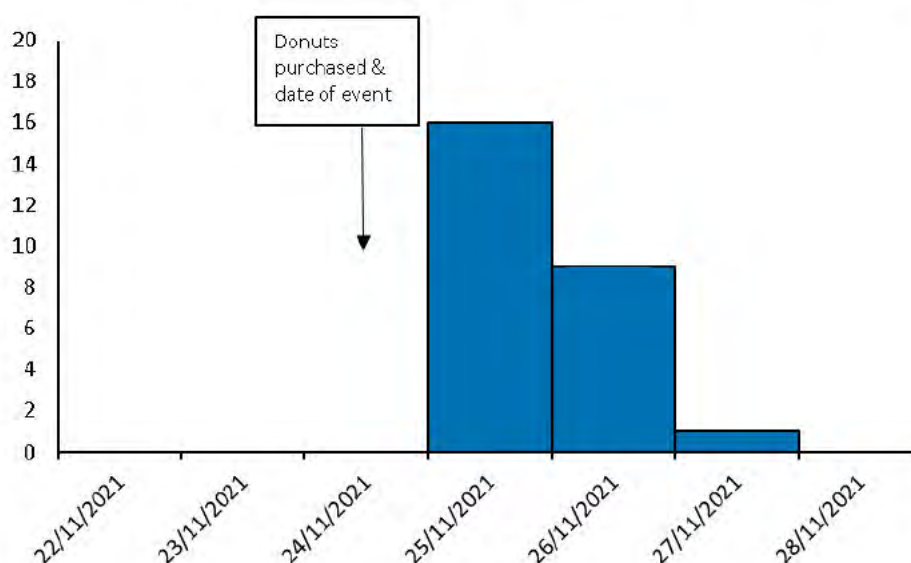
Case control study

- The [REDACTED] hosted a catered morning tea at 10:30hrs on 24 November 2021.
- The catering from Mrs Kim's Donuts contained a mixture of 192 donuts, including filled and unfilled donuts, purchased the morning of the event.
- No other foods were provided at this event, and no other catered/group meals were provided during the work week from 22 November to 26 November.
- 140 people attended the morning tea
- 59 attendees completed the survey
- Of the 59 attendees, 27 met the case definition. An additional 5 attendees reported a milder illness without vomiting or diarrhoea.
- The age and sex distribution of the [REDACTED] cohort is shown in Table 4.
- An epidemic curve of the [REDACTED] cohort is shown in Figure 2.

Table 4: Age and sex of ill and not-ill respondents, [REDACTED] outbreak, 24 November 2021.

	Ill	Not ill	Total
Total	27	32	59
Sex			
<i>Male</i>	103	38	39
<i>Female</i>	112	47	20
<i>Missing</i>	0	0	0
Age			
<i>0-19 years</i>	0	0	0
<i>20-39 years</i>	22	22	44
<i>40-59 years</i>	5	10	15
<i>60 years +</i>	0	0	0
<i>Missing</i>	0	0	0

Figure 2: Epidemic curve of the [REDACTED] outbreak, 24 November 2021.



- The main features of illness associated with the [REDACTED] cohort were:
 - The median incubation period was 35.1 hours (range 12.5-71.4 hours, IQR 31.3-45.2 hours)
 - The median illness duration was 38.8 hours (range 3.5-87 hours, IQR 22-66 hours)
- A summary of the attack rates by filling type and top donut flavours consumed is shown at Table 5.
- The only statistically significant association was found between eating any kind of filled donut and a person becoming unwell, however the confidence interval for this association is wide (OR:7.56, 95% CI: 1.22-200.61).

Table 5: Summary of attack rates and odds ratios for donuts, by filling type and the most commonly eating flavours, served at the [REDACTED] outbreak, 24 November 2021.

Donut eaten	Exposed				Unexposed				OR	95% CI
	Ill	Not Ill	Total	AR	Ill	Not Ill	Total	AR		
Any donut	27	32	59	45.8%	0	0	0	N/A	N/A	N/A
Donut filling type										
Any filled donut	26	24	50	52.0%	1	8	9	11.1%	7.56	1.22-200.61
Any cream/custard filled donut	15	16	31	48.4%	12	16	28	42.9%	1.24	0.44-3.56
Any caramel/jam/Nutella filled donut	7	8	15	46.7%	20	24	44	45.5%	1.05	0.31-3.50
Any unfilled donut	5	3	8	62.5%	22	29	51	43.1%	2.13	0.45-12.07
Most frequently consumed donut flavours										
Nutella [^]	4	5	9	44.4%	23	27	50	46.0%	0.95	0.20-4.13
Vanilla custard [*]	4	3	7	57.1%	23	29	52	44.2%	1.65	0.31-9.73
Dark chocolate mousse [*]	0	4	4	0.0%	27	28	55	49.1%	N/A	N/A
Crème Brûlée [*]	1	3	4	25.0%	26	27	53	49.1%	0.4	0.13-3.76
Salted caramel [^]	3	1	4	75.0%	24	31	55	43.6%	3.5	0.38-105.01
Cookies and cream [*]	2	2	4	50.0%	25	30	55	45.5%	1.2	0.12-12.18

Note: * have a cream/custard filling made at the food premises, [^]have a pre-bought Nutella, salted caramel, or jam filling

Environmental Health Investigation

Initial food safety inspections – 25 November 2021

- A food safety inspection was conducted at 15:30 hrs on 25 November 2021. Prior to inspection, the proprietor had informed HPS there were no food samples on site as they had disposed of all products following customer complaints regarding illness.
- Food Handlers have designated activities during preparation; with separate staff for baking such as dough preparation and frying, and for decorating, including custard or filling preparation, piping fillings, icing donuts.
- Dough making is kept separate from other activities in the premises in separate mixing bowls. Proofing and cooking of donuts are automated.
- Custard and cream fillings are made on site and do not contain egg. Custard fillings are made in batches using sugar, milk, and custard powder, with purchased flavourings added.
- Flavourings are stored in tubs and used 'until empty', which is approximately a 2-day period. Compliance with storage times was unconfirmed due to date labels missing from some storage containers.
- The food business uses reusable piping bags for fillings.
- Food Handlers reported using tea towels to rest cooking utensils and for wiping hands.
- Food Handlers reported serving donuts wearing gloves and using tongs.
- There were no reports of staff illness. The proprietor reported only two staff members worked at the business.
- During the inspection, 10 environmental swabs were collected from surfaces, mixing equipment, and door handles.
- A follow up inspection was conducted at 18:00 hrs to collect additional samples including 6 food samples, 7 additional environmental swabs, and 1 piping bag.
- No cloths or tea towels were available for sampling.
- A deep clean using bleach was recommended by the Environmental Health team on 26 November 2021 as the pathogen was unknown.
- A review of the food grade sanitiser at the premises indicated it was the original product and content that was photographed at the initial registration inspection in July 2021.
- The proprietor requested clearance from ACT Health to reopen the premises. The proprietor advised that as the businesses had voluntarily closed, they did not require clearance or approval to reopen.

29 November 2021

- An onsite visit was attempted on 29 November 2021 however the proprietor advised via phone that he was interstate.
- The proprietor reiterated only two staff had worked in the period of interest, and there were no reports of illness from staff or customers being unwell during this period.

Formal Interview Invite

- The proprietor was invited to a formal interview on 1 December 2021 at the Offices of the Health Protection Service. The proprietor initially accepted however following local media reports the interview was declined.
- The proprietor again reiterated only two staff had worked in the period of interest and that both had been well. The proprietor also confirmed there were no incidents of customers being unwell at the premises.

Interview with proprietor

- On 6 December 2021, an interview with the proprietor and the [REDACTED] (Food Handler) was conducted onsite to obtain additional information, discuss the suspected cause of the outbreak and confirm the cleaning and sanitising of the premises.
- Following reports from complainants of additional food handlers (front of house staff), the proprietor confirmed two additional staff had been working at the premises during 20 November 2021 and Wednesday 24 November 2021.
- Advice was provided regarding norovirus infection, the suspected cause of the outbreak, and transmission pathways.

Laboratory Investigation

Food and environmental samples

- Samples were collected from the food business on Thursday 25th of November and tested at the ACT Government Analytical Laboratories (ACTGAL).
- Environmental swabs, and the piping bag were tested for two primary pathogens:
 - 10 environmental samples were tested for *Salmonella* spp.
 - 7 environmental swabs and piping bag were tested for *Listeria monocytogenes*
- The environmental swabs and piping bag returned “Not Detected” results.
- 6 Food samples were tested for *Salmonella* spp., *L. monocytogenes*, *E. coli*, standard plate count (SPC), *Clostridium perfringens*, *Staphylococcus aureus*, *Bacillus cereus*, and coliforms (a hygiene indicator).
- All 6 Food samples returned the following results: *Salmonella* spp. (Not Detected), *L. monocytogenes* (Not Detected), *E. coli* (<3 CFU/g), (<50 CFU), *Clostridium perfringens* (<5 CFU/g), *Staphylococcus aureus* (<50 CFU/g), *Bacillus cereus* (<50 CFU/g).
- Two of the 6 food samples returned results above detectable limits for coliforms:
 - Tiramisu filling – a custard-based filling prepared on site, coliform MPN (most probable number) per gram of 4.5
 - Cream filling – prepared on site, coliform MPN per gram of 920.0
 - The cream sample also returned a SPCV result of 920,000 CFU/g.
- A sample of white chocolate icing recorded a SPC result of 33,000 CFU/g, which was considered an unusual result for an icing product. The interview with the proprietor found that the same scoop had repeatedly been used for the white chocolate buds. The scoops were also stored within the product and may provide a vehicle for contamination.
- The coliform results may be indicative of a hand hygiene, storage, or cleaning issue.

- Testing for norovirus in food and environmental samples is not able to be conducted by ACTGAL. ACTGAL investigated whether other laboratories could test food samples for norovirus, but no other Australian laboratories had an accredited testing method for a cream-based food matrix.

Human samples

- 11 stool specimens were collected from ill respondents.
 - Eight specimens were positive for norovirus. This included two specimens that initially returned negative norovirus antigen results when tested at private pathology but were PCR positive when tested at ACT Pathology.
 - Two specimens were negative for norovirus, and all pathogens screened for in the laboratory tests. An additional specimen was collected, but had not requested norovirus testing, and was also negative for all pathogens screened for in the laboratory tests.
 - One of the norovirus positive specimens was also positive for *Dientamoeba fragilis* and *Aeromonas* species.
 - The clinical significance and pathogenicity of *Dientamoeba fragilis* is unclear and is not considered to be a likely cause of illness.
 - *Aeromonas* species can be associated with diarrhoeal disease in humans but has also been reported as a common isolate among asymptomatic individuals. Contact with fresh or estuarine water is the most common source of infection, and this pathogen has not been associated with foodborne illness outbreaks in Australia¹.

Discussion

- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median illness duration of 48 hours. Fewer cases reported fever, and less than 10% of cases reported blood in stool.
- These features satisfy Lively's criteria² and are suggestive of norovirus infection. This pathogen typically has an incubation period of 10-50 hours (mean 24-48hrs) and symptom duration of 1-3 days. Symptoms of norovirus include abdominal cramps, diarrhoea, nausea, vomiting, and myalgia. Norovirus is highly infectious and is spread from the vomit or faeces of an infected person. Infection can occur from close person-to-person contact, consuming contaminated food or drink (often contaminated through poor food handling or poor hand washing), or contact with contaminated objects or surfaces (such as door and tap handles).
- Foodborne norovirus outbreaks have historically been associated with foods that have no kill step (i.e., uncooked) and/or are subject to lots of handling, such as salads. Donuts have not been identified as a vehicle previously.
- While all ill cases reported eating a donut, no single flavour or filling type was identified as the likely source of infection. This suggests widespread contamination of the donuts sold by the food business. The most likely source of norovirus contamination in this outbreak was an ill food handler, who contaminated donuts during the cooking, decoration, or serving processes over multiple days. No food handlers admitted to working while ill.
- There were no reports of vomiting or diarrhoeal episodes at the store, making it unlikely that environmental contamination was the mode of transmission.

Limitations

- The epidemiological study was subject to:
 - Selection bias from the sampling method and response bias
 - sampling method: this outbreak relied on illness being reported directly to ACT Health and snowballing among contacts. No active case finding was undertaken to seek out well patrons. These limitations may bias the data towards ill patrons and limits the internal validity and certainty in the epidemiological investigation.
 - response bias: the respondents in this outbreak likely bias towards ill patrons, who may be more motivated to complete an interview or survey than their non-ill counterparts.
 - Measurement bias affected by the recall of participants, self-reporting, and change in data collection instruments. It is unclear if measurement bias has had a differential impact on ill or non-ill respondents, or
 - recall bias: interviews/surveys were conducted up to 21 days after purchasing the food product. This may affect a respondents recall of timing of events, duration of illness (if present), and memory of flavour/s consumed.
 - Self-reporting and misclassification: survey respondents self-reported symptom profile and dates and times of events without further clarification being sought that would occur in a phone interview (e.g., whether blood in stool or from another source, clarifying dates that appear contradictory). This may impact the quality of data collected.
 - interviewer bias: data collection was a mix of phone interviews and electronic surveys. Respondents to phone interviews may have been subject to differential levels of probing by different interviewers, compared with the survey where the questions were worded the same for all respondents. This may have affected the quality of data collected.

Conclusion

- At least 215 people had gastroenteritis after eating donuts purchased from Mrs Kim's Donuts Kingston between Saturday 20 November 2021 and Wednesday 24 November 2021 inclusive.
- Most cases reported diarrhoea, abdominal cramps, and vomiting, with a median incubation period of 33 hours and a median symptom duration of 48 hours.
- The symptom profile of this outbreak satisfied Lively's criteria for norovirus and was supported by eight positive norovirus samples.
- All cases ate at least one donut. No single flavour or filling type was associated with illness.
- While the source of contamination was unable to be confirmed, it is suspected that a food handler worked while infectious and contaminated the donuts through the cooking, decoration and/or serving processes.
- This investigation highlights the potential for a foodborne illness outbreak in a food product not previously considered as a vehicle for norovirus.
- Future foodborne illness outbreaks should employ active case finding where possible to provide greater certainty in the investigation and its findings.
- Use of food home delivery service (i.e., [REDACTED], [REDACTED], [REDACTED]) records for investigation of foodborne outbreaks should be investigated.
- This outbreak was a single incident related to processing practices at the food business. No ongoing public health risk was identified.

Contact:	Keeley Allen
Position:	MAE Scholar
Phone:	5124 6215

Reference List

¹ Fernández-Bravo A, Figueras MJ. An update on the genus *Aeromonas*: taxonomy, epidemiology, and pathogenicity. *Microorganisms*. 2020 Jan;8(1):129.

² Lively JY, Johnson SD, Wikswo M, Gu W, Leon J, Hall AJ. Clinical and epidemiologic profiles for identifying norovirus in acute gastroenteritis outbreak investigations. In *Open forum infectious diseases* 2018 Apr (Vol. 5, No. 4, p. ofy049). US: Oxford University Press.

From: Allen, Keeley (Health)
Sent: Monday, 14 February 2022 5:33 PM
To: Pingault, Nevada (Health)
Subject: Draft after action meeting notes
Attachments: Draft - after action meeting notes - 20220214.docx

OFFICIAL

Hi Nevada,

Are you able to have a quick review of the attached summary of the after action meeting from today? I may need some finessing and softening of language before circulating to the wider group.

Best,
Keeley

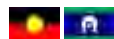
Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.

After action meeting – Mrs Kim's Donut outbreak

Monday 14 February 2022

Attendees

CDC: Keeley Allen, Felicity Greenville, Jenny Post, Nevada Pingault

Microbiology: Natasha Waters, Victoria Wansink

Environmental Health: Lyndell Hudson, Arif Mirza

Public Health Physician: Phillipa Binns

Summary

This document summarises the review of actions following the Mrs Kim's Donuts outbreak, highlighting aspects that went well, items for improvement, and actions for follow up. This document summarises feedback by area of work. Actions are included at the end of each area of work and collated at the end of this document.

The key challenges, lessons learnt and actions following this outbreak include:

- Approval for active case finding was not achieved, significantly skewing data towards ill patrons and limiting the strength of epidemiological evidence.
- While the proprietor was the initial notifier and stayed engaged throughout the investigation, most food samples were disposed of, and cleaning undertaken prior to the first inspection.
- Communication to the Microbiology was limited and impacted the team's ability to plan their workflow and weekend staffing
- It was unclear who was leading the investigation (this is normally a public health physician), impacting communication.
- There was instability in the public health physician support provided for this outbreak, limited support for CDC operations, and competing priorities with school outbreaks of COVID-19.

Disease Surveillance

What went well

- Use of REDCap – initial interviews were conducted on paper and via phone interview. A REDCap survey instrument was used after the first two days to improve the efficacy of information collection, inputting information directly into a database, and free up the Disease Surveillance team. REDCap was used for online surveys, and for phone interviews. REDCap could be explored for generally food poisoning complaints.
- Diverting food poisoning complaints – Sending complaints directly to Disease Surveillance sped up ACT Health response time. The ability to send non-outbreak cases back to Environmental Health also freed up the Disease Surveillance team.
- Support from other teams – The Vaccine Management Unit were able to provide interview assistance, and to deliver stool sample collection kits to cases.
- Verifying human samples – two samples tested by Capital Pathology return negative antigen tests. Further testing by different laboratories after insistence from Disease Surveillance found they were PCR positive.

What could be improved

- Active case finding – the epidemiological investigation was hampered by the inability to actively contact patrons in this outbreak. The business did not keep records of past orders, and Disease Surveillance were prevented from contacting food delivery apps to identify patrons. This skewed responses significantly towards unwell patrons who were making complaints (who in turn we often only alerted by incidental social media reports), and limits the strength of analysis, and for future outbreaks, could limit the strength of evidence in a court proceeding.
- Communication of human testing results – some human sample results were communicated ad hoc through the outbreak investigation team, linking two outbreaks. Links may have been made further if a single public health physician was identified as the point of contact, and/or a single team lead
- Non-testing of ill people at hospitals and GPs – around twenty ill complainants had advised they has sought medical care before interview, and only one had had a stool sample requested. This made the human sample component of the investigation reliant on delivering stool sample collection kits. A letter alert was sent through the Capital Health Network and to hospital emergency departments. This is recognised as an ongoing issue.

Action items

Investigate the utility of a REDCap database for general food poisoning complainants and develop a threshold for an outbreak-specific REDCap project

With Environmental Health, identify food delivery apps contacts for active case findings

Phoning clinical leads of emergency departments earlier in an outbreak investigation to flag the importance of stool sample collection

Feedback to Capital Pathology on the utility of antigen tests and PCR tests for norovirus.

Environmental Health

What went well

- Engaged proprietor and relationship building – ACT Health were first alerted to the outbreak by the proprietor. The Environmental health team developed a good relationship with the proprietor and staff and were able to keep communication channels open throughout the outbreak investigation
- Speed of first inspections – two on-site inspections were able to be completed within 7 hours of receiving the first food poisoning complaint. This included doing a second inspection for sample collection after finding ingredients on site at the first inspection when initially being advised that no food was on site.

What could be improved

- Having food sampling equipment – initial report no food products on site were incorrect. While a second inspection was conducted immediately, this delay in theory could enable more cleaning and disposal of food product.
- Having cloth sampling equipment available – tea towels and cloths were present at the first site inspection and were removed by the second inspection. Cloths may contain the pathogen of interest and should be collected where present.

Action items

Have food and cloth sampling equipment for all food poisoning complaint site inspections, regardless of initial reports from proprietors.

With Disease Surveillance, identify food delivery apps contacts for active case findings

Fortnightly sharing of food premises complaints with Disease Surveillance to cross-check against case interviews for notifiable conditions.

Microbiology

What went well

- Investigation of norovirus testing capacities - contacting public health labs in other jurisdictions found that Food and Environmental Laboratory has processes for norovirus testing for berries and shellfish/seafood. While the fatty consistency of food products in this outbreak would not have been viable, this laboratory may be able to assist in future outbreak investigations.

What could be improved

- Communication to Microbiology – this is a recurring issue for outbreak investigations, and Microbiology are often left out of initial informal discussions and need additional notification of samples coming. Delays in communication impact the ability to prepare media and ensure sufficient staffing for weekends. The physical separation at HPS has hindered communication during this investigation.
- Collection of statutory samples – collection of samples to these specifications provides a chain of custody form to assist in accountability and any potential court proceeding
- Summary of results – several food and environmental results were received in succession for this outbreak investigation and other environmental health matters. A short summary to note the unusual results, or results of interest may assist Environmental Health in their discussions with proprietors.

Action items

Investigate if other public health laboratories in Australia can process environmental swabs for norovirus

Investigate a short summary of results to note/flag for further discussion for Environmental Health and Disease Surveillance team.

Public Health Physicians

What went well

- Briefing – ART minutes provided an update for rotating public health physicians

What could be improved

- Stability of support – three different public health physicians were attending the ARTs. This resulted in repetition at each meeting providing the same

updates for each meeting, especially regarding food and environmental sampling. A public health physician is typically the lead for foodborne outbreaks, however it remained unclear throughout the outbreak investigation what their role was, and which public health physician to approach

- Communication during initial investigation – one the first day/evening of the investigation, Environmental Health had difficulty identifying a public health physician to inform of the outbreak and to assist in the investigation. Significant work was prepared through the evening of the initial investigation by Microbiology, Environmental health, and Disease Surveillance to brief the public health physician, but no public health physician remained to receive the information.
- Balancing priorities – at the time of this outbreak, the ACT was reported 10-20 COVID-19 cases per day and largely associated with primary school sites. Limited engagement with the outbreak investigation was at one point justified in an ART as the suspected pathogen (norovirus) is less severe than SARS-CoV-2. It was noted that public health physicians at the Bowes Street office have largely stopped attending CDC meetings. It was unclear during the outbreak investigation which public health physician to approach.

Action items

Public health physician/registrar roster to be shared with CDC.

Request public health physician/registrar to be more of a presence in CDC operations.

In the absence of a roster, include all public health physicians in communications

Project management and ART process

What went well

- ART structure – the ART provided a formal communication channel between teams and were useful to make clear who was involved, the appropriate contacts, and what was feasible for each team to provide. The ART minutes were also a record keeping tool to assist in formal reporting. There was a discussion on the utility of ARTs for smaller outbreaks, and a note made that any informal replacements for ARTs for smaller outbreaks must include Microbiology from the start.
- Reporting – Disease Surveillance led reporting with valuable feedback from Microbiology and Environmental Health, resulting in a well-rounded, robust report

What could be improved

- Timing of the first meeting – the first ART was held after two site inspections and interviews with four groups of complainants. It is recognised that there are significant time pressures at the initial stages, however an ART should occur prior to site inspections to enable Microbiology to prepare for samples and to guide the investigation.
- Leadership – it was unclear who was intended to be the leader throughout the outbreak investigation. This role is normally filled by the public health physician who has a direct communication channel to the CHO. However, the instability of public health physician support prevented this occurring, and the Director, Environmental Health Food Safety acted as the informal, de facto leader for this investigation in their absence. Identification of a formal leader could assist in mitigating communication challenges experienced in this outbreak.

Action items

Identify the leader of outbreak investigation formally at the first ART and include on the meeting outcomes under ART Chair.

List of action items

Business as usual

Action	Team
Investigate the utility of a REDCap database for general food poisoning complainants and develop a threshold for an outbreak-specific REDCap project	Disease Surveillance, Environmental Health
Identify food delivery apps contacts for active case findings – [REDACTED]	Environmental Health, Disease Surveillance
Feedback to Capital Pathology on the utility of antigen tests and PCR tests for norovirus.	Disease Surveillance
Fortnightly sharing of food premises complaints with Disease Surveillance to cross-check against case interviews for notifiable conditions.	Environmental Health
Investigate if other public health laboratories in Australia can process environmental swabs for norovirus	Microbiology
Investigate a short summary of results to note/flag for further discussion for Environmental Health and Disease Surveillance team.	Microbiology
Public health physician/registrar roster to be shared with CDC.	Public health physicians
Request public health physician/registrar to be more of a presence in CDC operations	CDC

For the next outbreak

Action	Team
Phoning clinical leads of emergency departments earlier in an outbreak investigation to flag the importance of stool sample collection	Disease Surveillance, Public Health Physician
Have food and cloth sampling equipment for all food poisoning complaint site inspections, regardless of initial reports from proprietors.	Environmental Health
In the absence of a roster, include all public health physicians in communications	Disease Surveillance, Environmental Health, Microbiology
Identify the leader of outbreak investigation formally at the first ART and include on the meeting outcomes under ART Chair.	HEMU

From: Allen, Keeley (Health)
Sent: Wednesday, 2 March 2022 4:55 PM
To: Blackwell, Rhian (Health)
Cc: Pingault, Nevada (Health)
Subject: After action meeting notes - Mrs Kim's Donuts
Attachments: After action meeting notes - Mrs Kims Donuts.docx

Hi Rhian,

Please find attached the after action meeting notes for the Mrs Kim's Donuts outbreak. I apologise again that we forgot to invite HEMU to the meeting.

Please let me know if you have any questions.

Best regards,
Keeley

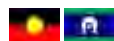
Keeley Allen (she/her) | M. Phil (Applied Epidemiology) Scholar

Ph: 5124 6215 | Email: keeley.allen@act.gov.au

Disease Surveillance Unit, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder ACT 2611

health.act.gov.au



I acknowledge the Aboriginal and Torres Strait Islander peoples as the traditional custodians of the lands and waters of Australia, and the Ngunnawal and Ngambri people as the traditional custodians of the land in the ACT and surrounding NSW. I value the continuing contribution of their culture to this region and pay my respects to Elders past and present.



After action meeting – Mrs Kim's Donut outbreak

Monday 14 February 2022

Attendees

CDC: Keeley Allen, Felicity Greenville, Jenny Post, Nevada Pingault

ACTGAL Microbiology: Natasha Waters, Victoria Wansink

Environmental Health: Lyndell Hudson, Arif Mirza

Public Health Physician: Phillipa Binns

Summary

This document summarises the review of actions following the Mrs Kim's Donuts outbreak, highlighting aspects that went well, items for improvement, and actions for follow up. This document summarises feedback by area of work. Actions are included at the end of each area of work and collated at the end of this document.

The key challenges, lessons learnt and actions following this outbreak include:

- Approval was not given for active case finding using food delivery service orders, significantly skewing data towards ill patrons and limiting the strength of analytical evidence.
- While the proprietor was the initial notifier and stayed engaged throughout the investigation, most food samples were disposed of, and cleaning undertaken prior to the first inspection.
- Communication to the Microbiology was limited and impacted the team's ability to plan their workflow and weekend staffing. It was noted this is a recurring issue.
- No investigation lead was assigned, impacting communication.
- There was instability in the public health physician support provided for this outbreak, limited support for CDC BAU operations, and competing priorities with school outbreaks of COVID-19.

Disease Surveillance

What went well

- Use of REDCap – initial interviews were conducted on paper and via phone interview. A REDCap survey instrument was used after the first two days to improve the efficiency of information collection, by inputting information directly into a database, which helped to reduce Disease Surveillance team workload. REDCap was used for online surveys, and for phone interviews. REDCap could be explored for generally food poisoning complaints.
- Diverting food poisoning complaints – Sending complaints directly to Disease Surveillance during the outbreak sped up ACT Health response time.
- Support from other teams – The Vaccine Management Unit provided assistance with case interviews and delivery of stool sample collection kits to cases.
- Repeat testing of human samples – two samples tested by Capital Pathology returned negative antigen tests for norovirus. Further testing by different laboratories after insistence from Disease Surveillance found these were PCR positive for norovirus.

What could be improved

- Active case finding – the epidemiological investigation was hampered by the inability to contact patrons that consumed food purchased from Mrs Kim's. The business did not keep records of past orders, and Disease Surveillance was not given permission by public health physicians to liaise with food delivery apps to identify patrons. This skewed responses significantly towards unwell patrons who were making complaints (either directly to HPs or via social media reports), and limited the strength of analysis, and for future outbreaks, could limit the strength of evidence in a court proceeding.
- Communication of human testing results – some human sample results were communicated ad hoc through the outbreak investigation team, linking two outbreaks. Links may have been made further if a single public health physician was identified as the point of contact, and/or a single team lead.
- Lack of testing of ill people at hospitals and GPs – around twenty ill complainants advised they had sought medical care before interview, and only one had a stool sample requested. This made the human sample component of the investigation reliant on HPS delivering stool sample collection kits. An alert was sent through the Capital Health Network and to hospital emergency departments to stress the importance of collecting faecal specimens. This is recognised as an ongoing issue.

Action items

Investigate the utility of a REDCap database for general food poisoning complainants.

In conjunction with Environmental Health, explore the use of food delivery app order information for active case finding.

Phoning clinical leads of emergency departments earlier in an outbreak investigation to flag the importance of stool sample collection.

Feedback to Capital Pathology on the utility of antigen tests compared to PCR tests for norovirus.

Environmental Health

What went well

- Engaged proprietor and relationship building – ACT Health were first alerted to the outbreak by the proprietor. The Environmental Health team developed a good relationship with the proprietor and staff and were able to keep communication channels open throughout the outbreak investigation.
- Speed of first inspections – two on-site inspections were able to be completed within 7 hours of receiving the first food poisoning complaint. This included doing a second inspection for sample collection after finding ingredients on site at the first inspection when initially being advised that no food was on site.

What could be improved

- Having food sampling equipment at initial inspection – initial report no food products on site were incorrect. While a second inspection was conducted immediately, this delay in theory could enable more cleaning and disposal of food product.
- Having cloth sampling equipment available – tea towels and cloths were present at the first site inspection and were removed by the time the second inspection was conducted. Cloths may contain pathogens of interest and should be collected where present.

Action items

Have food and cloth sampling equipment for all food poisoning complaint site inspections, regardless of initial reports from proprietors.

In conjunction with Disease Surveillance, explore the use of food delivery app order information for active case finding

Fortnightly sharing of food premises complaints with Disease Surveillance to cross-check against case interviews for notifiable conditions.

Microbiology

What went well

- Include a dot point about the sample testing going well
- Investigation of norovirus testing capacities - contacting laboratories in other jurisdictions found that some have processes for norovirus testing for berries and shellfish/seafood. While the fatty consistency of food products in this outbreak were not suitable for testing, these laboratories may be able to assist in future outbreak investigations, depending on the vehicle.

What could be improved

- Communication to Microbiology – this is a recurring issue for outbreak investigations, and Microbiology are often left out of initial informal discussions and the laboratory needs adequate notice of samples coming. Delays in communication impact the ability to prepare media and ensure sufficient staffing for weekends. The physical separation at HPS has hindered communication during this investigation.
- Consider collection of statutory samples – collection of samples to these specifications provides a chain of custody form to assist in accountability and any potential court proceeding.
- Summary of results – several food and environmental results were received in succession for this outbreak investigation and other environmental health matters. A short summary to note the unusual results, or results of interest may assist Environmental Health in their discussions with proprietors.

Action items

Investigate if there are any laboratories in Australia that can process environmental swabs for norovirus.

Investigate a short summary of results to note/flag for further discussion for Environmental Health and Disease Surveillance team.

Public Health Physicians

What went well

- Briefing – ART minutes provided an update for rotating public health physicians.

What could be improved

- Stability of support – three different public health physicians attended the ARTs. This resulted in repeatedly providing the same updates for each meeting, especially regarding food and environmental sampling. A public health physician has historically been the lead for foodborne outbreaks, however it remained unclear throughout this outbreak investigation what their role was, and which public health physician to approach.
- Communication during initial investigation – on the first day/evening of the investigation, Environmental Health had difficulty identifying a public health physician to inform of the outbreak and to assist in the investigation. Significant work was prepared through the evening of the initial investigation by Microbiology, Environmental health, and Disease Surveillance to brief the public health physician, but no public health physician remained to receive the information.
- Balancing priorities – at the time of this outbreak, the ACT reported 10-20 COVID-19 cases per day which were largely associated with primary school sites. All public health physician capacity, bar 0.4 FTE, was devoted to the COVID-19 response. Limited physician engagement with this investigation was justified in an ART due to norovirus being assessed as less severe than SARS-CoV-2.

Action items

Public health physician/registrar roster to be shared with HPS BAU.

Request that public health physician capacity be increased for HPS BAU operations.

Request that a dedicated public health registrar for HPS BAU be reinstated.

Outbreak management and ART process

What went well

- ART structure – the ART provided a formal communication channel between teams and were useful to make clear who was involved, the appropriate contacts, and what was feasible for each team to provide. The ART minutes were also a record keeping tool to assist in formal reporting. There was a discussion on the utility of ARTs for smaller outbreaks, noted that any informal replacements for ARTs for smaller outbreaks must include Microbiology from the start.
- Reporting – Disease Surveillance led writing the outbreak report with valuable feedback from Microbiology and Environmental Health, resulting in a well-rounded, robust report.

What could be improved

- Timing of the first meeting – the first ART was held after two site inspections and interviews with four groups of complainants. It is recognised that there are significant time pressures at the initial stages, however an ART should occur prior to site inspections to enable Microbiology to prepare for samples and to guide the investigation.
- Leadership – it was unclear who was the investigation lead.. Historically, this role was filled by the public health physician who has a direct line of communication with the CHO. However, the instability of public health physician support prevented this occurring, and the Director, Environmental Health Food Safety was the informal lead for this investigation in their absence. Identification of a formal lead could assist in mitigating communication challenges experienced in this outbreak.

Action items

Identify the outbreak investigation lead formally at the first ART and include on the meeting outcomes as a line item under ART Chair.

List of action items

Business as usual

Action	Team
Investigate the utility of a REDCap database for general food poisoning complainants	Disease Surveillance, Environmental Health
Explore use of food delivery apps for active case findings – [REDACTED]	Environmental Health, Disease Surveillance
Feedback to Capital Pathology on the utility of antigen tests versus PCR tests for norovirus.	Disease Surveillance
Fortnightly sharing of food premises complaints with Disease Surveillance to cross-check against case interviews for notifiable conditions.	Environmental Health
Investigate if laboratories in Australia can process environmental swabs for norovirus	Microbiology
Investigate a short summary of results to note/flag for further discussion for Environmental Health and Disease Surveillance team.	Microbiology
Public health physician/registrar roster to be shared with HPS BAU.	Public health physicians
Public health physician/registrar to be more involved in HPS BAU operations	Public health physicians

For future outbreaks

Action	Team
Phoning clinical leads of emergency departments early in an outbreak investigation to flag the importance of stool sample collection	Disease Surveillance, Public Health Physician
Have food and cloth sampling equipment for all food poisoning complaint site inspections, regardless of initial reports from proprietors.	Environmental Health
Public health physician / registrar assigned to HPS BAU activities	Public Health Physician
Identify the outbreak investigation lead formally at the first ART and include on the meeting outcomes as a line item under ART Chair.	HEMU

From: Martin, Victor (Health)
Sent: Monday, 14 March 2022 9:58 AM
To: Pingault, Nevada (Health); Kingsbury, Alison (Health)
Cc: SupportHPS
Subject: FW: DUE MIDDAY FRIDAY 11 MARCH FW: Communicable Disease Immunisation Conference abstract and minute Critical Date 13 March 2022
Attachments: Minute - Conference abstract for norovirus abstract.docx; CDIC abstract-20220228.docx
Importance: High

Hi Alison, Nevada,

A couple of questions:

- Which conference?
- The draft abstract states that the 'suspect source was...'. What information do we have to base this suspicion on – I would put it lower than a suspicion – maybe our hunch/instinct. Are there any alternative suspected or possible sources?
- Has EH-Food/ACTGAL been consulted on the abstract?

Thanks

Victor

From: Moroney, Rebecca (Health) <Rebecca.L.Moroney@act.gov.au> **On Behalf Of** SupportHPS
Sent: Tuesday, 8 March 2022 3:04 PM
To: Martin, Victor (Health) <Victor.Martin@act.gov.au>
Cc: SupportHPS <ED-HPS-support@act.gov.au>
Subject: DUE MIDDAY FRIDAY 11 MARCH FW: Communicable Disease Immunisation Conference abstract and minute Critical Date 13 March 2022
Importance: High

OFFICIAL

Hi Victor

Minute to you to request approval of an Abstract. (its less than 1 page – EASY)

Closing date is Sunday 13 march.

Thank you – Bec 😊

Rebecca Moroney (she/her) | Executive Assistant to Executive Branch Manager, Health Protection Service

Ph: 5124 9252 | Email: ED-HPS-support@act.gov.au

Business Management Services, Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder, ACT 2611

health.act.gov.au



From: Kingsbury, Alison (Health) <Alison.Kingsbury@act.gov.au>
Sent: Monday, 7 March 2022 1:21 PM

To: SupportHPS <ED-HPS-support@act.gov.au>

Subject: Communicable Disease Immunisation Conference abstract and minute Critical Date 13 March 2022

OFFICIAL

Hi Bec,

Please see attached a minute to Victor and abstract for the Communicable Disease and Immunisation Conference which Keeley wishes to submit.

Let me know if victor needs any further information.

Regards

Alison

Alison Kingsbury

Senior Director Communicable Disease Control

Ph: 5124 9255 | Email: alison.kingsbury@act.gov.au

Public Health, Protection and Regulation | ACT Health Directorate

25 Mulley Street, HOLDER ACT 2611 | Locked Bag 5005, Weston Creek, ACT, 2611

health.act.gov.au



SUBJECT: Conference abstract describing foodborne norovirus outbreak at Mrs Kim's Donuts

To: Victor Martin, Executive Branch Manager, Health Protection Service

From: Alison Kingsbury, Senior Director, Communicable Disease Control

From: Nevada Pingault, Director, Disease Surveillance, Communicable Disease Control

Date: 1 March 2022

Purpose

To seek your approval for a conference abstract describing the norovirus outbreak associated with Mrs Kim's Donuts in November 2021.

Issues

Members of the Disease Surveillance Unit at Health Protection Services have drafted a conference abstract describing the norovirus outbreak associated with Mrs Kim's Donuts in November 2021. This outbreak investigation is novel due to the vehicle identified and the scale. The conference abstract has been reviewed by the Director, Disease Surveillance.

The conference abstract is intended for submission to the Communicable Diseases & Immunisation Conference 2022 to be held from 20-22 June 2022 in Sydney. The deadline for abstract submission is Sunday **13 March 2022**.

All data have been aggregated and de-identified, including the food premises involved. If accepted for the conference, the presentation and speaking notes will be reviewed by members of the Disease Surveillance Unit and sent for approval to the Executive Branch Manager.

Recommendations

That you approve the conference abstract for submission to the Communicable Diseases & Immunisation Conference 2022.

AGREED/NOT AGREED /PLEASE DISCUSS

.....

Victor Martin
Executive Branch Manager
Health Protection Service
March 2022

Name Nevada Pingault
Title Director, Disease Surveillance, CDC
Branch Health Protection Service
Division Public Health, Protections and Regulation
Date: 1 March 2022

Action Officer: Keeley Allen
Unit: CDC
Extension: 46215

Background: An outbreak of gastroenteritis was investigated following complaints of illness after eating donuts from a food business in the Australian Capital Territory (ACT).

Methods: Food poisoning complainants and contacts were surveyed using a standard gastroenteritis questionnaire including menu items from the food business. Descriptive analyses were performed for all responses. A nested case-control study was conducted for a group of 140 people at a catered function. Active case finding was not able to be pursued in this investigation. A food safety inspection was also conducted.

Results: At least 215 individuals reported vomiting and/or diarrhoea following consumption of a donut purchased over a five-day period. 100% of ill respondents reported eating a donut. The median incubation period was 33 hours and median illness duration of 48 hours, with diarrhoea, vomiting and abdominal pain most commonly reported. Eight specimens collected from affected individuals were positive for norovirus.

59 attendees of the work function were surveyed, with an attack rate of 46% among respondents. No single flavour was identified as the likely source of infection. Eating any kind of filled donut was statistically associated with a person becoming unwell (OR:7.56, 95% CI: 1.22-200.61).

The suspected source of infection was an unwell food handler and a lapse in safe food handling procedures.

Conclusion: Donuts are a novel vehicle for norovirus infection. While this was one of the largest foodborne outbreaks investigated in the ACT, the true extent of illness remains unknown. Active case finding should be pursued to determine the magnitude of outbreaks.