Assessing public outdoor drinking fountain prevalence and quality: Using outdoor field observation in playgrounds

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August 2017

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ABSTRACT

Background

Appropriate public access to water is an increasing concern, with drinking fountain prevalence and quality one indicator of civic attention to the issue. Outdoor field observation can be used to find the occurrence and functionality of health-related public resources, so as to better plan, maintain and advocate for them. In the limited literature on drinking fountains in non-school (public) locations, we found only two field observation studies and none that tested a method across many jurisdictions.

Methods

To further explore such observational methods, we aimed to survey drinking fountains in playgrounds across many local government areas. We systematically collected data (including photographs) of drinking fountains in randomly selected public playgrounds in 17 local government areas (TLAs) in New Zealand.

Results

The method worked without problems and the time for playground surveys was always less than 15 minutes. We found only one of the 17 TLAs had working drinking fountains in all the playgrounds sampled, and 11 working fountains in all 54 playgrounds (20%). Nine of the fountains had side taps, but none had dog drinking bowls.

Three had metal discolouration within 1cm of the nozzle. The nozzle surround design appeared to affect cleaning ability and sunlight exposure. Design features contributed to insufficient waste water collection and inadequate surface surroundings, which could result in soft, wet or muddy ground.

Conclusion

The systematic observation method worked and was relatively quick, making it suitable for local officials and health promoters. Photos provide a checkable data source. The method could be used as part of a parks and playground audit, and/or as part of a necessary systematic evaluation of the provision of drinking water in public places. Further research could use similar methods to better establish the presence,

quality and operation of drinking fountains across larger cities, and to compare drinking water access between countries. Bigger surveys could assess provision by area deprivation, and by area-specific summer temperatures and risk of heat waves.

INTRODUCTION

The supply of drinking water is a civic and public health issue, due to the need to reduce the consumption of sugary drinks by re-normalising water use,[1, 2] and to reduce the risk of heat stroke with increased heat waves.[3] In a number of countries (eg, the USA) there has been a decrease in drinking fountains for a variety of causes.[4]

Good access to water in outdoor public places is increasingly recognised as an urban and health issue.[5-9] Civic and health advocates and policymakers need accurate information on the prevalence, distribution and quality of water supplies that are freely accessible by the public, so as to better plan, maintain and advocate for them.

The evaluation of the presence and quality of physical health-related public facilities can be conducted by a variety of methods, including surveys and a range of observation techniques. For this study, we defined outdoor field observation as the collection of physical data by photography or visual means, so as to better understand the effects of a physical or social setting. Such direct observation can provide objective data on the presence and functionality of assets and infrastructure.[10]

While there is a literature on drinking water availability and standards in schools (eg,[1, 11]) there is less on the prevalence of drinking fountains in urban public places. We found a US survey of reported access to drinking fountains in parks and playgrounds, with 55% of the adults using these settings reporting access to fountains.[12] Another US study found strong (89%) support for required access to drinking water in parks.[13] An Australian study found a lower reported presence of fountains in the public open spaces of lower socio-economic areas.[14]

The only objective evaluations of the availability of fountains in non-school (public) locations that we could find were a c2013 study of neighbourhood parks in a North Carolina city [15], and a previous 2014 New Zealand study.[16] The former found nine fountains in 21 parks, as part of survey using the Environmental Assessment of Public Recreation Spaces (EAPRS) audit tool.[17] They recorded the condition and cleanliness of park features, and reported that 88.9 % of fountains were in ‘poor’ or ‘fair’ condition.[15]

The latter located seven public fountains in ‘all outdoor public areas (along sidewalks, in public recreation areas and in other public spaces)’ in four neighbourhoods in two cities. Both recorded data using a pen and paper data collection method, but only Pearson et al used photographs.[16] These photographs were ‘used to determine an aesthetic appeal score (based on maintenance and desirability for drinking) for each water fountain via consensus amongst six observers. They did not report on functionality, vandalism or aesthetics of the public fountains separately to those found in schools. Neither study reported on the time taken to access an area. We found no study that assessed the distribution and quality of public drinking fountains across a number of jurisdictions, or that aimed to use solo observers with little training to quickly obtain reliable data.

METHODS

To further explore the suitability of field observation for the evaluation of health-related public assets, we aimed to survey fountains in playgrounds across a larger number of local government areas, so as to better determine their distribution and quality, and to further develop the methods used. Our methodological aims included simplicity, able to be used with a minimum of training, the ability to check the data, testing the method across many jurisdictions, and a short field data collection time per site.

Study design: Systematic outdoor field observation by solo observers.

Setting: New Zealand is a temperate Southwest Pacific country with a population of under five million. Playgrounds were selected as the type of outdoor public facility where access to water might be considered important, due to thirst amongst children during and after physical play, and the need to normalise water as an alternative to sugar-sweetened beverages. While the New Zealand Recreation Association has a ‘Territorial Authority Best Practice Assessment Tool and Guide’ for sports and recreation,[18] it is for high level planning, rather for asset evaluation. There appears to be no official guidelines for public outdoor drinking fountains. There is a New

Zealand Standard for playground equipment and surfacing (NZS 5828:2015) which 'specifies general requirements for playground equipment and surfacing for New Zealand',[19] but this is only for play equipment. There is an Australian and New Zealand plumbing Standard for drinking fountains.[20]

Sample: We used a convenience sample of 17 contiguous Territorial Local Authorities (TLAs) in the lower North Island of New Zealand (see Table 1). There were eight TLAs where the population was principally in a city (of over 40,000 people) and nine with a rural or small town population. The TLAs ranged from one of the most socio-economically deprived, with a population under 10,000 (Wairoa) to the one with the highest median income in New Zealand, and a population of over 200,000 (Wellington).

Table 1: Results for the 17 local government areas in the lower North Island of New Zealand

Local government area (CC: City Council; DC: District Council)	Playgrounds with or without working drinking fountains within 100m of playground equipment		Total (N)
	No fountain (N)	Working fountain present (N)	
Carterton DC	1	1	2
Central Hawkes Bay DC	1	1	2
Gisborne DC	2	0	2
Hastings DC	2	1	3
Horowhenua DC	2	0	2
Kapiti Coast DC	0	2	2
Lower Hutt CC	6	0	6
Manawatu DC	1	1	2
Masterton DC	1	1	2
Napier CC	2	0	2
Palmerston North CC	4	1	5
Porirua CC	3	1	4
South Wairarapa DC	2	0	2
Tararua DC	2	0	2
Upper Hutt CC	3	0	3
Wairoa DC	2	0	2
Wellington CC	9	2	11
Total	**43**	**11**	**54**

Playground selection: A random selection of playgrounds was made from a full denominator list. This list was generated from information from TLA websites, or where playground lists were not available; we compiled them ourselves by identifying playgrounds from the satellite view in Google Maps in all the parks in the TLA area. We sampled either 10% of the playgrounds or two per TLA, whichever figure was higher. This resulted in all TLAs having two playgrounds sampled except for: Upper Hutt and Hastings (each n=3), Porirua (n=4), Palmerston North (n=5), Lower Hutt (n=6) and Wellington (n=11), for a total of 54 (Table 1).

Field observations: Between December 2016 and May 2017, at least one of two observers walked around the perimeter of each playground area so as to survey the area within 100 metres of the play equipment, and around all built facilities within 100m (eg, toilet blocks or sports facilities). The time taken for a playground survey was noted.

Photographs were taken of any signage in the park area where the presence of the fountain was referred to, and of the fountains. The observers ensured that no identifiable people were photographed. All photos were taken in daylight, in periods without rain. A cell phone or digital camera was used to take photographs, which were stored on computers for later viewing. Photos were filed in folders that were named for the playground site. The observers (the authors) had previous experience photographing the signage at playgrounds.[21]

Data collection on each drinking fountain: Each fountain found was photographed, usually several times for each of following aspects:

- From a distance (20-30m) and from between 5-10m, to provide locational and other context to the fountain.
- Close up to show any features such as side taps or attached basins for animal drinking (the latter supports dog walking, which has human health co-benefits).
- A close photograph (side-on and level with the drinking nozzle) of the water stream to allow assessment of the water flow (turbulent or linear) and strength of flow.

- A close photograph of the nozzle where the water leaves the fountain – to assess for discolouration (eg, from biofilm).
- A photo of the playground or park name, or a nearby street name.

All of the taps were tested and if any did not work this was noted. Notes were taken on any features of the fountains or their context that might affect the fountains' usage.

Data analysis

The photos of fountains and the field notes were analysed separately by two observers, to record side taps, dog bowls, estimated fountain age, vandalism, maintenance, discolouration around the nozzle, and any other relevant features. Where there were differences in the data found, discussions enabled a standardising of the data (usually one observer had not noticed a feature).

RESULTS

The methods worked without any problems and all playground surveys took less than 15 minutes to conduct per site. This covered all photographs, testing of taps and data recording. Generally, between 10 and 20 photos were taken at each playground. The analysis of photos and notes for the features of interest (such as side taps) and for other relevant aspects of fountain context and design, took approximately 10 minutes per fountain. Photo quality was sufficient to see the type of water flow (see Figure 1).

Figure 1: Poorly maintained fountain with grass growing in the drainage sink

Only 20% (11) of the 54 playgrounds had a working drinking fountain within 100 metres of the playground equipment. None had more than one fountain. Two additional playgrounds had a fountain with a non-functioning tap for the drinking nozzle (although the side tap worked on one). Only one (a rural/small town area) of the 17 TLAs had a working fountain in all (2/2) the playgrounds sampled. Eight of the TLAs sampled (47%) had fountains in only some (9/33) of the playgrounds sampled, and another eight TLAs had *no* drinking fountains in any of the 19 playgrounds sampled in those TLAs (Table 1).

Of the 11 working fountains, nine (82%) had side taps for filling water bottles or bowls (eg, see Figure 2), but none had attached bowls for dogs to drink from (in contrast to other drinking fountains we have seen elsewhere in New Zealand). From the lack of tarnish, scratches, and other evidence, all the fountains appeared to be less than ten years old, and had no evidence of vandalism. The flow from all the working nozzles was good (the water spout was more than 10cm from the nozzle). The water stream was sufficiently smooth for easy drinking in all cases, with the stream in Figure 1 being the most marginal case. The working fountains appeared to be well maintained, with the grass growing out of one (see Figures 1 and 2) an exception.

Figure 2: Example of fountain with side tap

Three fountains had discolouration on the metal surround (eg, from biofilm) within 1 cm of the nozzle of the fountain (see Figure 3). One fountain in the small child area of a playground was less than 70cm high (see Figure 4), and there was no regular sized fountain found anywhere around that playground. No signs were found around any of the playgrounds which indicated the presence of drinking water fountains.

Figure 3: Example of discolouration (probably from biofilm) around a drinking fountain nozzle

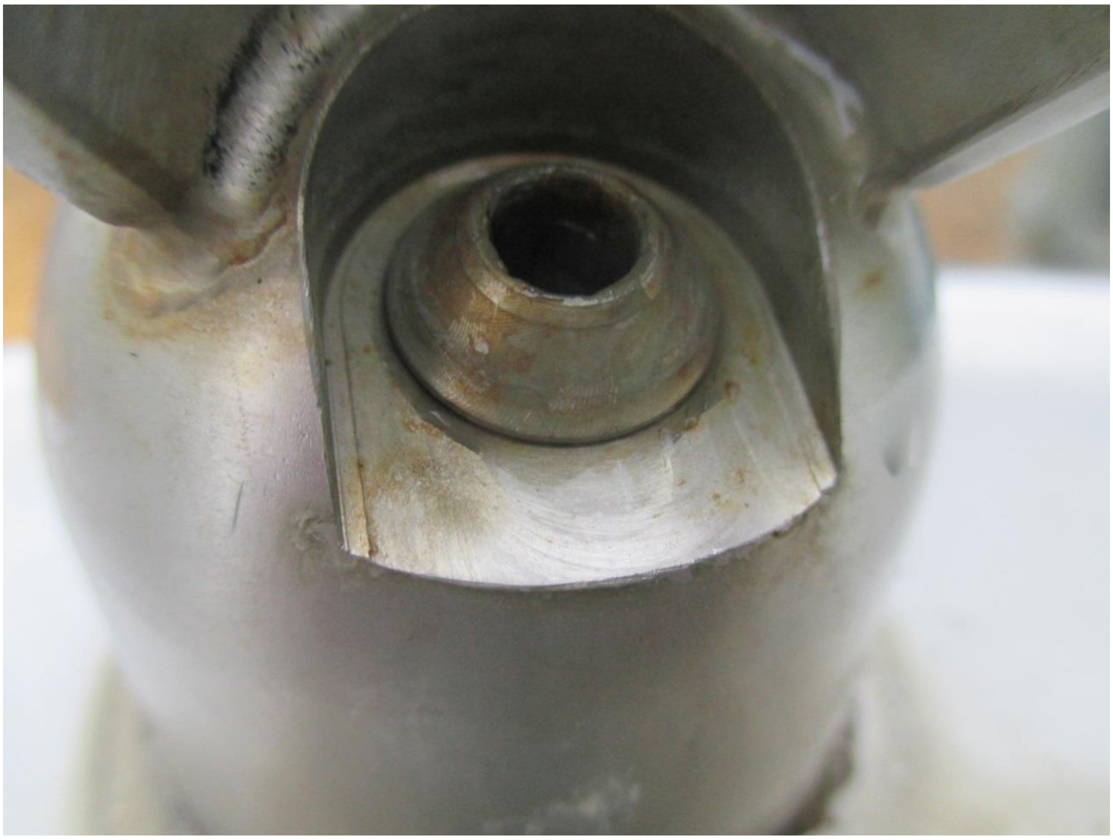

Figure 4: Drinking water fountain designed for under-five year children (there were other fountains in the playground)

There were two additional design features found that could affect the fountains' use. First, fountains varied in the type of nozzle surround used, so as to help prevent lip contact or damage to the nozzle (eg, see Figures 2, 3 and 4). The nature and extent of such surrounds appeared to affect the ability to clean around the nozzle, to allow sunlight exposure, and to increase the likelihood of discolouration. Second, some fountains did not sufficiently collect the waste water from the drinking nozzles or side taps, and/or did not have suitable surfaces for the water to drain away, resulting in soft, wet or muddy ground around the fountain (eg, see Figures 2 and 4).

DISCUSSION

We found that this systematic field observation worked well and was (once on-site) a quick way of collecting data on the presence, nature and operation of this type of health-related public outdoor facility. As such it was similar to our experience in studying health-related signage at playgrounds (smokefree and dog-control) in the same country [21]. While access to sites across a number of jurisdictions can take time and resources, within jurisdictions this method could be a simple and easy way for local health promoters and officials to assess fountain presence and quality (and other health-related assets such as signage). Such inspections could be part of a parks and playground audit eg,[22].

Photos provide data that can be checked and interpreted by multiple observers, and provide information for all sites once a feature (such as waste water collection) is identified as of interest or relevant. The wide availability and use of digital cameras and cell phones with cameras means that there are small costs involved. However, to be sure of sufficient photo quality, sufficient daylight is necessary.

Policy implications

There appears to be a need in New Zealand (as in other countries) for the systematic requirement and provision of drinking water in public places.[23] Some principles need to be observed in the development of such provision. The number of children and their proportion in the site population can provide a priority guide. Civic authorities need strong procedures in place for the monitoring, maintenance, repair, and replacement of drinking fountains and the water provided, reinforced by required national standards.[4]

Further research

Further research could use similar methods to examine the presence, quality and operation of more drinking fountains per area, across larger numbers of local government areas and larger cities, and to compare drinking water access between countries. Bigger surveys could assess provision by area deprivation, and by area-specific summer temperatures and risk of heat waves. While childrens' playgrounds seem a relative priority area for the presence of drinking fountains, other relatively high priority sites for such research include parks with sports fields, public squares, and popular beach locations.

While Google Street View is increasingly being used for field research in the built environment,[24] our preliminary work found it of limited value with these fountains (and so we did not evaluate it formally). The utility was limited because some fountains were located relatively deep in parks and away from roads. But when the "footpath view" function of Google Street View is more widely available in such parks, then this tool could be studied more formally for this purpose.

CONCLUSIONS

Our systematic use of observation, tests and photographs provided a workable and quick (under 15 minute) data collection method for assessing the fountains, tested across 17 local jurisdictions and 54 playgrounds. Local officials and health workers could develop versions to help evaluate a range of health-related public physical assets.

Acknowledgements: We thank the local government authorities that detail on their websites the presence and location of children's playgrounds in their territories.

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