

Odour Nuisance and the Need for Effective Complaint Measures in Malaysia: A Case Study of a Public Institution in Penang

Nastaein Qamaruz Zaman*, Zuriana Mat Jam

School of Civil Engineering, Universiti Sains Malaysia, Engineering Campus, 14300 Nibong Tebal, Pulau Pinang, Malaysia
cenastaein@usm.my

Odour regulations worldwide highly regard odour complaints to indicate compliance to an Environmental Act regarding odour emissions. However in Malaysia, odour nuisance is rarely reported, and on the rare occasions complaints are made, they are usually passed straight to the mass media. Is the rarity of odour complaints in Malaysia an indicator of an odour-free environment or are there different reasons?

This research is undertaken to understand the impact of prolonged odour to the residents and the initiatives taken to make known their plight. Questionnaires were given to students at a public institution in Penang, Malaysia, along with an odour descriptor classifying various smells into 8 major odorants.

All respondents agreed there has been a lingering malodour ever since they enrolled at the hostels, with 63 % finding the odour to be quite annoying and smelling offensive (93 %). The nearby factories (100 %), farms (61 %) and sewerage systems (39 %) were perceived as major contributors to the malodour. The smell is usually evident during nighttime and is worst during windy conditions (89 %) and after rain (53 %). Although the students were apparently disturbed by the continuing odour and had access to various forms of communication facilities, none voiced a formal complaint about the issue. The lack of well-defined complaint channels, procedures and the mechanism of addressing the registered complaints were found to influence the respondents' inclination to make complaints. Unlike other contaminants like COD, PM10, heavy metals etc., odour is very subjective in nature and becomes a nuisance only when cumulative annoyance on the people from repeated events of odour emissions are evident, hence the need for improvement in odour complaints management data for Malaysia are recommended.

1. Introduction

Odour nuisance to the community is often detected through complaints raised by the residents. One of the methods to recognize the impact of odour to the neighbourhood is through the information collected in a survey.

The study by Sakawi et al. (2011) is one of a few shedding light on odour awareness among Malaysians. Their study on residents living 2 km off two landfills found that 85% of the 190 respondents agreed that the nearby landfills were the source of the stench and that the malodour affected the tranquility and quality of life (84% respondents) as well as their health (81%). Unfortunately, only half of the respondents actually complained of the smell either to the local authorities (42%), elected representative (14%), housing associations (12%), or mass media (12%).

The education background of the respondents may have influenced the perception on 'odour as a nuisance' from landfills (Tengku Izhar et al., 2013) and their inclination to voice their ill comfort. As found by Gronhaug and Zaltman (1981), active complainers to public services were often those with higher income, higher education and a tendency to be younger than non-complainers. Hence, the low complaint rates by respondents in the study by Sakawi et al. (2011) were probably due to the higher proportion of poorly educated or primary/high school leavers (66%) compared to those receiving tertiary education (34%).

This study is proposed to evaluate the tendency of young and well educated respondents towards odour recognition, their annoyance level and their willingness to voice dissatisfaction over the odour exposure. The results from this study are important to help design effective odour complaint measures, fitting to the socio-demographics of the site, in order to better capture the impact of one or several odour sources to the surrounding community.

2. Methodology

2.1 Location of the study

The study on odour exposure and complaint measures was conducted on hostel students of Desasiswa Jaya and Desasiswa Lembaran at the Universiti Sains Malaysia Engineering Campus, Nibong Tebal, Pulau Pinang, Malaysia. The 320 acres campus started operation at its current location in 2001 with currently 3200 enrolled undergraduate and postgraduate students.

2.2 Data collection and analysis

A survey addressing the FIDOL factors (Frequency, Intensity, Duration, Offensiveness and Location of odour) was distributed to students living in the two hostels. The questionnaire had a total of 19 questions, categorized into 4 parts; Part 1: Personal Information, Part 2: Malodour Problem, Part 3: Identifying Sources of Odour and Part 4: Impact of Malodour. The perceived odour intensity scale of 0-4, whereby 0: no odour, 1: weak odour, 2: distinct odour, 3: strong odour and 4: very strong odour was used in the questionnaire. An odour descriptor classifying various smells into 8 major odorant (floral, fruity, vegetable, earthy, offensive, fishy, chemical and medicinal) (St. Croix Sensory Inc., 2005) was also included to help with odour characterization. Data from the questionnaire was analyzed using Microsoft Excel.

3. Results and discussions

3.1 Respondents' background

A total of 200 students from both hostels, 30 % male and 70 % female, responded to the survey. Most of the respondents were between 18 – 25 years old (91 % of the respondents), and the remaining were between 26 – 40 years old (9 %). Respondents with smoking history were only 10 % and had smoked less than 5 years.

3.2 Odour exposure

All respondents agreed there has been a lingering malodour ever since they enrolled at the hostels, with 63 % found the odour to be relatively strong. The smell was characterized most as offensive (sewers and chicken) (93 %), followed by chemicals-like smell (56 %) and earthy (31 %) (Figure 1). A small percentage (13 %) of respondents was unsure of the odour characteristic.

The respondents thought the nearby factories (100 %), farms (61 %) and sewerage system (39 %) contributed most to the malodour (Figure 2). This is not surprising as USMEC is in a rural area, where palm oil processing activities, poultry farms and pulp and paper mills have long existed before USMEC started operation here in 2001. The offensive smell of sewer and decay could result from dimethyl sulphide, dimethyl disulphide and methyl mercaptan commonly emitted from pulp and paper mill stacks (Chan, 2006 and Lacorte et al., 2003) as well as wastewater lagoons (Beghi et al, 2012). The earthy smell could be from geosmin in the pulp and paper mill effluent (Watson et al., 2003) as well as from the palm oil mill effluent treatment ponds. Geosmin is an organic compound produced by a range of microorganisms, notably by cyanobacteria and actinomycetes in the water bodies (Kutovaya and Watson, 2014). The data in Figure 2 is merely to gauge the respondent's awareness on the odour producing activities in their locality and thus should not be used to implicate an odour contributor without further investigation. The characterization of the odorous compounds, the odour concentration of these sources located less than 2 km off the campus in combination with dispersion modelling would better clarify their contributions to the environmental odour experienced by the students.

The malodour is evident from 3 pm (59 % respondents agreed), becomes stronger from 7 pm until midnight (78 %) and starts to recede from then onwards until 6 am (59 %). The higher odour annoyance at night could be due to the combined effect of lingering malodour under stable conditions (low wind speed and cool clear condition) and the fact that hostel windows are left open by the students at night for improved ventilation when staying up late.

A majority of the respondents agreed that odour is also worst in windy conditions (89 %) and after rain (53 %). Researchers have shown that the release of geosmin spores due to the breakdown of actinomycete

from the force of a downpour leads to the burst of the earthy-musty odours after rainfall. Actinomycete bacteria grow in warm, wet soil including river water (Gerber, 1977 and Lanciotti et al., 2003) and sediments (Zuo et al., 2009). It is unclear, however, whether the strong earthy-musty smell in this study especially after a heavy shower is related to the nearby effluent ponds treating pulp mill and palm oil mill effluents, from an on-site oxidation pond or from the nearby Kerian River. The investigation on the microbiology of these water bodies and their contribution to odorous emissions especially after rainfall are a subject of a further study.

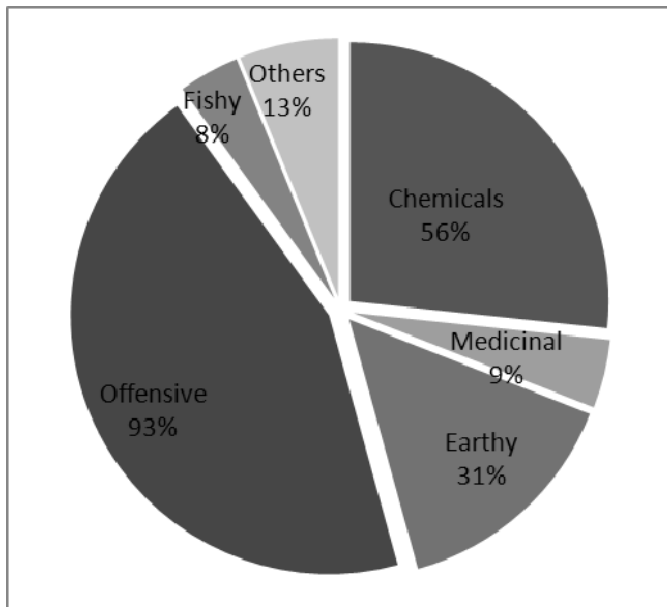


Figure 1 The odour qualities perceived by the respondents (respondents were allowed to choose more than one option)

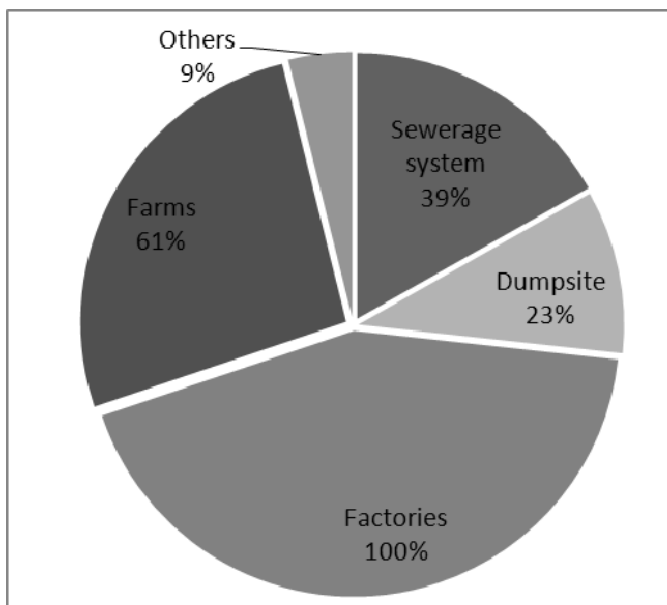


Figure 2 The perceived odour emitters to the Engineering Campus malodour (respondents were allowed to choose more than one option)

3.3 Complaint measures

The respondents reported of discomforts, feeling weak and loss of appetite when it smells (89 %), and 51 % became highly agitated during these events. Despite the adverse effects caused by the repeated odour, it is striking that none voiced a formal complaint about the issue. This is surprising as the initial assumption was that younger and well educated individuals are traits of active complainers (Gronhaug and Zaltman, 1989), hence are likely to voice their dissatisfaction over odorous conditions in comparison to less educated and older people. Further, these students have access to various communication means, e.g. transportation, telephone, internet and computers, and therefore are not deprived of facilities to make complaints. The result regarding a low complaint rate in this study echoes that of Phau and Bard (2008) who, in their investigation of the different forms of retaliatory responses towards unsatisfactory service encounters experienced by Australian consumers, found that gender, income and education have no effect on the complaining behaviour for both complainers and non-complainers.

Figure 3 highlights the issue behind the non-complaint. The reason was because half believed their complaints would not be addressed seriously by the relevant authorities and thought that the complaints process would be lengthy. On hindsight, the 200 respondents thought phone calls (62 %) would work best as a complaint medium over emails, in person or letter (Figure 4), which could be further investigated and maybe implemented.

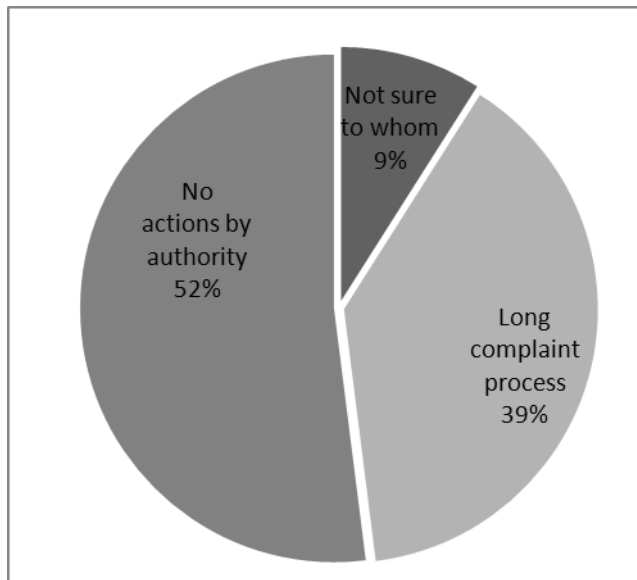


Figure 3 Reasons for not reporting an odour complaint

In this regard this study suggests the following countermeasures as target areas of improvement:

- (i) effective dissemination of complaint channels,
- (ii) campaigns to increase public awareness on odour pollution and their rights to an improved condition, and
- (iii) transparency in the complaints process and data management, whereby the public is well informed of the actions taken by the relevant authorities over their plight.

In the case of the odour impact to the campus students, it was found that as situation-coping mechanism, the respondents learnt to adapt to the odorous condition and accepted the constant smell as part and parcel of living in a rural area.

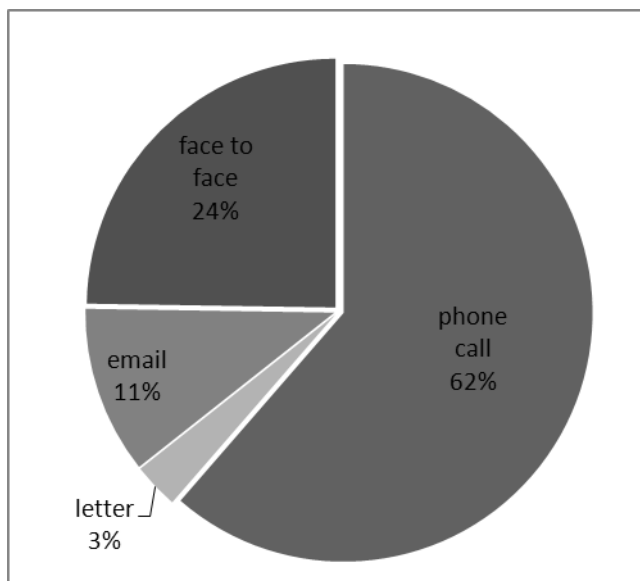


Figure 4 Preferred media to voice odour complaints

4. Conclusions

This study demonstrated the lack of an odour complaint medium, which could be the very obstacle towards the improvement of odour pollution for the country. This is because, unlike other contaminants like COD, PM10, heavy metals etc., odour is very subjective in nature and becomes a nuisance only when cumulative annoyance on the people from repeated events of odour emissions are evident, hence the need for reliable odour complaint data.

Education and age do not influence the tendency to voice complaints, nor do the facilities available to the complainants. Rather, the lack of well-defined complaint channels, procedure and the mechanism of addressing the registered complaints are the controlling factors behind reluctance in making complaints. Areas for further improvement in odour complaint management are also proposed.

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