Get ready for the flood! Risk-handling styles in Jakarta, Indonesia

van Voorst, R.S.

Publication date
2014

Tables

Table 1: Historical overview of river flood hazard in Jakarta

Date	Recorder damage and risk due to flooding
1621, 1654, 1876	No recorded data
January 9, 1932	Several houses in Dabang and Thamrin Streets were inundated
February 1, 1976	More than 200.000 people were evacuated
January 19, 1977	About 100.000 people were evacuated
January 8, 1984	About 291 neighbourhood areas with 39729 inhabitants were inundated
February 13, 1989	4400 families were evacuated
January 13, 1997	745 houses were inundated and 2640 inhabitants were evacuated
January 26, 1999	Flash flood occurred in Tangerang, Bekasi and Jakarta. Six inhabitants died and 30.000 people were displaced.
January 29, 2002	Big floods occurred in Jakarta, Tangerang, and Bekasi. Two inhabitants died and 40.000 people were displaced
February 2-4, 2007	60% of Jakarta City was inundated. Approximately 80 people died. Another 340,000 and 400,000 inhabitants were displaced.
January 31 – February 5, 2008	Floods in Jakarta and Tangerang. 26.000 houses were inundated and 1550 people were displaced.
January 19, 2009	Floods in sub-districts Bidara Cina, Kampung Melayu, Cawang, Bukit Duri, Angke, Petamburan, Tanjung Priok, Kelapa Gading, Koja, Cilincing, Rawa Badak, Kamal Muara, and Kapuk Muara. These areas were inundated by between 10 and 50 centimeters of water. Floodwaters also caused lengthy traffic jams in many main streets in Jakarta.
October 5-7, 2010 & February 13, 2010	In October, sub-disctricts Bidara Cina, Kampung Melayu, Cawang, Koja, Cilincing, and Bukit Duri were flooded. These areas were inundated by between 10 and 50 centimeters of water. Floodwaters also caused lengthy traffic jams in many main streets in Jakarta. In February, floods killed at least 2 people and displaced more than 1,700 in Kampung Melayu, Bukit Duri and the Bidaracina areas.
February 5, 2011	A large flood inundated the neighbourhood of Jl. Gunung Sahari. Also a 50-centimeter-deep flood submerged the main road connecting Mangga Dua Square and the Ancol amusement park. The flooding also affected TransJakarta buses bound for Ancol.
December 24, 2012	Floodwater with a maximum height of 2.5 meters inundated Kampung Pulo, Kampung Melayu, East Jakarta. Three casualties were reported. According to the Jakarta Police, the water level in various areas in other parts of the city was estimated at between 15 centimeters and 50 centimeters. These affected areas include Ciracas, East Jakarta; Bukit Duri, South Jakarta; and KH. Abdullah Syafei in Tebet, South Jakarta.
January 15, 2013 – February 5, 2013	Severe floods kill at least 40 people. More than 40.000 people were displaced, and more than 100.000 people's homes were inundated.

This table was constructed on the base of the following literature sources: Marfai, Yulianto, Hizbaron & Ward, 2009; Aerts et al. 2009; Brinkman & Hartman, 2009, p. 2; Texier, 2008, p. 1; Rukmana, 2009a ; Rukmana, 2009b; Rejeki, 2012.

Table 2: Flood alert levels in Bantaran Kali

Phase	Bogor (water level in cm)	Depok (water level in cm)	Manggarai (water level in cm)
Normal	40-100	150-200	500-650
IV	100-110	200-270	650-750
III	110-120	270-300	750-850
II	120-140	300-350	850-950
I	Higher than 140	Higher than 350	Higher than 950

Source: personal communication with sluicegate keeper (name withheld; the interview was conducted on 7 November 2010, at the sluice in Manggarai, Jakarta) and with Bapak Sapari, head of police in the wider area of Bantaran Kali, 3 December 2010.

Table 3.1: The association between occupancy and risk-handling styles

Risk-handling style	No occupancy; no income	Irregular job; irregular income	Steady job or pension; fixed monthly income	Total
Orang antisipasi	**N = 2**	**N = 21**	**N = 6**	**N = 29**
	7 %	**72 %**	**21 %**	**100 %**
Orang ajar	**N = 10**	**N = 5**	**N = 3**	**N = 18**
	55 %	**28 %**	**17 %**	**100 %**
Orang susah	**N = 4**	**N = 10**	**N = 9**	**N = 23**
	17 %	**44 %**	**39 %**	**100 %**
Orang siap	**N = 3**	**N = 15**	**N = 7**	**N = 25**
	12 %	**60 %**	**28 %**	**100 %**
Mean	**20 %**	**54%**	**26 %**	**100%**

In Table 3.1, the associations between occupancy and risk-handling styles is presented in numbers and relative percentages. From the theoretical argument developed in this thesis, it was taken that occupancy and related income flows can have an effect on people's vulnerability towards floods and also on their risk-handling practices. The logic behind this is that people who do not have a fixed job, do not enjoy a fixed income either. This can cause financial stress, and it makes actors more vulnerable towards floods because they are less well able to recover from floods independently. For example, if people lack a regular income, it can be difficult for them to afford reparations of their house after it has been damaged by a flood. More examples of theoretical presumptions that are typical for this stream of literature, are provided in chapter one.

In order to test the presumed associations between occupancy and risk-handling styles in practice in the field, it was noted for all 130 study-participants whether they enjoy a fixed monthly income, either from a steady job (for example: working in a governmental institution or working as a cleaner in an office) or from a pension (which few respondents received, because they had worked for a governmental institution in their younger days); or whether they receive an irregular income from an irregular job (for example: a trader makes money on some days but not on other);or whether they are unemployed and hence have no income from a job at all. These data were compared in an SPSS factor-analysis with the four risk-handling styles defined in this thesis.

In Table 3.1 we can see the division of types of occupation per risk-handling style in percentages and in number of individual cases. A chi-square test showed that clusters (risk-handling styles) are significantly associated with occupancy (χ^2 = 21; df=6; p = 0.01). However, this result needs to be considered with caution, for it does not meet the first condition of a chi-square test, namely, that no more than 20 per cent of the expected counts may be less than five (Yates, Moore & McCabe, 1999, p. 734). [239]. In this case, five cells or approximately 33 per cent of the cells have an expected frequency that is lower than five. This suggests that, even though the software indicates that the association between occupation and risk-handling style is significant, there is still a probability that the differences between the observed and expected frequencies occurred by chance.

That having said, it is nevertheless interesting to look what this table can tell us about the association between occupation and risk-handling styles in Bantaran Kali. In Table 3.1 we can see that the large majority of *orang antisipasi* have an irregular job and hence an irregular daily or weekly income. This means that these people do not have a fixed, monthly income, but that instead they get paid for irregular services. Examples of these irregular jobs are moneylending, trade or prostitution – see chapter 3 for more examples.

For the *orang ajar*, we can see that slightly more than half of them has no occupancy and hence no income from a job. If we compare this number to the overall mean of respondents without occupancy or income (20 per cent), we can see that the *orang ajar* rate a remarkable high percentage (55 per cent). For an interpretation of these numbers, see chapter 4.

Of the *orang susah*, a small minority of respondents has an irregular job, while the second-largest group enjoys a fixed income from a regular job or a monthly pension. In line with the argument that was made in chapter 5, this analysis thus shows that these residents are relatively well able to recover from floods independently from aid-institutions. This is an interesting result, regarding the fact that *orang susah* receive much more aid after floods than fellow residents in

[239] The second important condition for a chi-square test is that all individual expected counts must be 1 or greater. This condition is met in this analysis: the expected count is 2,15.

Bantaran Kali. See chapter 5 for more information about the risk-handling practices that *orang susah* exhibit to claim aid after floods.

Regarding the *orang siap*, this table shows that the majority has an irregular income, while nearly a third has a fixed monthly income.

Table 3.2: The association between age and risk-handling styles

Risk-handling style	Age older than 60	Age between 18 and 60	Total
Orang antisipasi	**N = 11**	**N = 18**	**N = 29**
	38 %	**62 %**	**100 %**
Orang ajar	**N = 14**	**N = 4**	**N = 18**
	78 %	**22 %**	**100 %**
Orang susah	**N = 7**	**N = 16**	**N = 23**
	30 %	**70 %**	**100 %**
Orang siap	**N = 7**	**N = 18**	**N = 25**
	28 %	**72 %**	**100 %**
Mean	**41 %**	**59%**	**100 %**

In Table 3.2, the associations between age and risk-handling styles is presented. From the theoretical argument developed in this thesis, it was taken that age can have an effect on people's vulnerability towards floods and also on their risk-handling practices. The logic behind this is that elderly people and children can have more difficulties in protecting themselves against floods. For example, an elderly person might have trouble evacuating quickly and independently. The same may be said for a young child, who is dependent of others during evacuation.

No children participated in this study, therefore only the assumption that old age has an effect on risk-behaviour could be tested in the field. In Indonesia, the average life expectancy is sixty-eight years old.[240] There are no formal numbers available about the average life expectancy in the research area, but on the basis of my own observations in Bantaran Kali it can be established that the average life expectancy in the kampong is between fifty-five and sixty-five years. Therefore it seemed reasonable in this study to label study-inhabitants whom are older than sixty as 'elderly'. It can thus be logically expected that adults under sixty are less vulnerable to floods than are older people, as they have the best option to protect independently their personal safety against flood-

[240]This information was retrieved 5 October 2013, from http://geography.about.com/library/weekly/aa042000b.htm; and from http://www.infoplease.com/world/statistics/life-expectancy-country-2009.html

risk. In line with this expectation, we might also expect that younger, adult people have the most active or independent risk-handling styles in Bantaran Kali.

In Table 3.2, we can see the division of age per risk-handling style in percentages and in number of individual cases. A chi-square test showed that risk-handling styles are significantly associated with age (χ^2 = 13; df=3; p = 0.05).[241] However, the assumption that elderly in Bantaran Kali have a less active risk-handling style than do adults under sixty, proved incorrect. Instead, Table 3.2 indicates that the large majority of *orang ajar* are aged over sixty, while it was argued in chapter 4 that orang ajar exhibit a highly active and rather independent risk-handling style. This suggests that the found association between age and risk-handling behaviour is significant in an unexpected way: it are the relatively elderly whom exhibit a most active and independent risk-handling style. The opposite is also true: a majority of the *orang susah* is far under sixty years old, but nevertheless they exhibit more passive risk-handling practices.

Again, the association between age and risk-handling style is significant, but in a different way than what could be expected from the literature.

For more information about the reasons underlying these risk-handling styles and an interpretation of the above results, I refer to chapters 4 (*orang ajar*) and 5 (*orang susah*).

Table 3.3: The association between gender and risk-handling styles

Risk-handling style	Male	Female	Total
Orang antisipasi	**N = 9**	**N = 20**	**N = 29**
	31 %	**69 %**	**100 %**
Orang ajar	**N = 13**	**N = 5**	**N = 18**
	72 %	**28 %**	**100 %**
Orang susah	**N = 9**	**N = 14**	**N = 23**
	39 %	**61 %**	**100 %**
Orang siap	**N = 7**	**N = 18**	**N = 25**
	28 %	**72 %**	**100 %**
Mean	**40 %**	**60%**	**100 %**

In Table 3.3, the associations between gender and risk-handling styles is presented. From the theoretical argument developed in this thesis, it was taken that gender can have an effect on people's vulnerability towards floods and also on their risk-handling practices. The logic behind this assumption is that women might have more difficulties in protecting themselves against flood-risk,

[241] Zero cells (0 per cent) have expected count less than five; the minimum expected count is 6,46. The two conditions for a chi-square test are thus met.

for example because they are physically weaker than man (which makes it harder to wade or swim through the currents of a flood). Another example of why women are generally considered more vulnerable to natural disasters than are men, has to do with cultural gender-differences: in Bantaran Kali, women typically look after the children while men are working outside the neighbourhood. This means that if flooding occurs in Bantaran Kali during working-hours, women must care after their children and themselves at the same time, which might endanger their safety. It also means that, because women spend more time in the flood-prone kampong than men do, they have a larger chance to be directly affected by a flood. The theoretical assumption that follows from such examples is that males are less vulnerable to floods than are females, and hence we might expect that males more often exhibit an independent risk-handling style; while females would typically make more use of external aid.

A chi-square test showed that risk-handling styles are significantly associated with gender (χ^2 = 10; df=3; p = <0.02).[242] However, the above expected association between gender and risk-handling style needs be rejected. I say this because Table 3.3 shows that a majority of *orang antisipasi* and *orang siap* is female. An important characteristic of both these styles is that they are largely independent from external aid-institutions, hence, people try to solve problems and cope with floods without the support of other actors involved in the flood management of Bantaran Kali. This means that the expected association between the female gender and dependency in flood-risk handling, needs be rejected for these styles.

For *orang susah*, Table 3.3 shows that a small majority is female. This suggests that the expected association between the female gender and a higher vulnerability proves true for this risk-handling style, for the *orang susah* are known to make much use of external aid (see chapter 5). However, I argue that such interpretation of the result would be erroneous. When the number of women with a *susah* risk-handling style is compared with the mean gender-division between risk-handling styles, it becomes clear that this number is approximately average (mean = 60 % female; percentage of female *orang susah* = 61% female). Hence, it seems more likely that the relatively high number of women with a *susah* risk-handling style is a product of a gender bias in my study, than an effect of higher material vulnerability among women in Bantaran Kali.

Finally, regarding the *orang ajar*, Table 3.3 shows that males have a larger chance of having an 'ajar' risk-handling style than females. Hence, for this risk-handling style, the expected association between the male gender and a lower vulnerability proves true. The reasons for this gender-bias in this style might be various. For example, it was proposed in chapter 4 that the relatively high number of male *orang ajar*, can be explained as an effect of gendered relationships in the patriarchal society

[242] Zero cells (0 per cent) have expected count less than five; the minimum expected count is 5,28. The two conditions for a chi-square test are thus met.

of Indonesia, where men more often than women take up authority positions. Furthermore, in order to develop an *aja*' risk-handling style, people must develop and maintain reciprocal and trustful relations with political actors involved in the flood-management of Bantaran Kali. As these political actors are mostly male, it can be argued that it is easier for male riverbank settlers than it would be for female riverbank settlers to establish reciprocal relationships with them.

Table 4: Scores on self-efficacy divided per risk-handling style

Risk-handling style	Very low	Low	Medium	High	Very high	Total
Orang antisipasi	N= 0	N = 0	N= 8	N= 15	N= 6	N= 29
	0 %	0 %	27,6 %	51,7 %	20,7 %	100 %
Orang ajar	N = 0	N = 0	N = 2	N = 4	N = 12	N= 18
	0 %	0 %	11 %	22 %	67 %	100 %
Orang susah	N = 2	N = 12	N = 9	N = 0	N = 0	N = 23
	8,7 %	52, 2 %	39,1 %	0 %	0 %	100 %
Orang siap	N = 0	N = 0	N = 3	N = 19	N = 3	N = 25
	0 %	0 %	12 %	76 %	12 %	100 %

In Table 4 we can see how high or low study-participants rated on indicators of self-efficacy. As remarked in chapter 2, the notion 'self-efficacy' refers to people's beliefs in their capabilities to produce desired effects by their own actions (Bandura, 1977b, p. vii). To 'measure' the self-efficacy of study-participants, I have calculated the relevant outcomes of two surveys into a 'score on self-efficacy' for each respondent. The first set of data that was taken into account for this calculation, was derived from the survey about risk-handling practices (see chapter 2 for more information about the way in which this survey was developed). I examined the answers that study-participants gave to the survey-questions, to see whether people exhibit practices in relation to flood-risk that are typically associated with a high self-efficacy. Examples of these indicators are 'emphasizing one's talents, skills and capacities' and 'keeping trust that one will remain safe in the future due to one's own actions and decisions'. The second set of data that was taken into account for a calculation of study-participants' 'score on self-efficacy', came from a psychometric questionnaire that 'measured' study-participant's self-efficacy.[243]

On the base of the answers that study-participants gave to the questions in the survey and the questionnaire, they were rated by me as having 'very low'; 'low'; 'medium'; 'high' or 'very high' self-efficacy. Next, these individual scores were compared to the results of the cluster-analysis (see

[243] It was explained in chapter 2 that, in this questionnaire, respondents answered questions about three kinds of cognitions that are considered relevant parameters of self-efficacy in risk-literature: risk perception (a person's belief that he or she runs a high risk of, in this research project, being flooded); outcome expectancy (the perception of the possible consequences of one's own action, hence, the conviction that if specific autonomous behaviour is adopted, one will remain safe from floods) and perceived self-efficacy (personal action control or agency, or the belief that one is capable to stay safe in spite of floods due to personal coping responses) (Paton et al. 2001; Paton, 2003, p. 213; Sjöberg, 2000; Schwarzer & Renner, 2000, p. 486).

chapter 2 and appendix D), in order to see whether scores on self-efficacy can be associated with a specific risk-handling style in Bantaran Kali. It appeared from a first analysis that the differences between the categories 'very low' and 'low'; and the differences between the categories 'very high' and 'high' were so small, that it was more fruitful to combine them. We proceeded with three categories of self-efficacy: low, medium and high.

A chi-square test showed that clusters are significantly associated with rates on the self-efficacy survey scale (χ^2 = 107,1; df=8; p = 0.00). However, this result needs to be considered with caution, for it does not meet the first condition of a chi-square test, namely, that no more than 20 per cent of the expected counts may be less than five (Yates, Moore & McCabe, 1999, p. 734). [244]. In this case, five cells or approximately 33 per cent of the cells have an expected frequency that is lower than five. This suggests that, even though the software indicates that the association between occupation and risk-handling style is significant, there is still a probability that the differences between the observed and expected frequencies occurred by chance.

That having been said, it remains interesting to examine the division of scores on 'self-efficacy' per risk-handling style, as there are some remarkable differences between the risk-handling style clusters. For example, Table 4 shows that *orang antisipasi* and *orang ajar* all rated between 'medium' and 'very high' self-efficacy; while none of them rated 'low' or 'very low' self-efficacy. In contrast, none of the *orang susah* rated 'high' or 'very high' self-efficacy. Instead, they rated somewhat higher than people with other risk-handling styles on 'very low' self-efficacy, and much higher on 'low' self-efficacy. Finally, most of the *orang siap* rated 'high' self-efficacy, and a minority of respondents with this risk-handling style rated 'medium' or 'very high' self-efficacy. None of them rated 'low' or 'very low' self-efficacy. For an interpretation of these results, I refer to the respective chapters in which the four risk-handling styles are defined and analysed.

[244] The second important condition for a chi-square test is that all individual expected counts must be one or greater. This condition is met in this analysis: the expected count is 2,91.