Analysis of LAEMS data to inform a study on inconsistencies in the delivery of official food safety controls

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Executive summary

The analysis in this report was undertaken to inform the design of a qualitative research study to gain insights into how/why *Confidence in Management* (CIM) scoring and the use of enforcement actions varies from one local authority to another.[1] The qualitative research study was to consist of in depth case studies at a small number of local authorities. The scope of the study was refined to focus on local authorities in England alone.

The LAEMS (Local Authority Enforcement and Monitoring System) data provides a rich data source for looking at variation in *Confidence in Management* (CIM) scores. A statistical model was built based on the LAEMS data, to attempt to control for differences in the characteristics of food establishments within each local authority, in order to uncover what could potentially be genuine inconsistencies between local authorities in how the CIM score is applied.

This paper presents the considerations in refining the scope of the study, findings from analysis of the LAEMS data and how these informed the design of the study.

Key findings

- As might be expected, CIM scores correspond closely to the other compliance scores in that establishments with worse scores for "Level of compliance – hygiene" (hygiene in terms of the handling and preparation of food) and "Level of compliance – structural" (the level of compliance in terms of the hygiene of the food premises) tend to have worse CIM scores. Even after controlling for this, we find that establishments assessed as having a high vulnerable groups intrinsic risk, or assessed as having a large number of consumers at risk were a food safety issue to arise, tend to have better CIM scores. While this may indicate some form of bias in how the CIM score is applied, it may be the case that food businesses that serve vulnerable consumers or have the potential to put a large number of consumers at risk, genuinely tend to have more enhanced food safety management/ control procedures in place.

- Among the establishments with the best hygiene/structural scores, those involved in higher risk food activities (in terms of type of food/ method of handling) tend to be given better CIM scores. At the other end of the scale, among the establishments with the worse hygiene/structural scores those involved in higher risk food activities tend to be given worse CIM scores. This suggests the possibility that in practice, CIM scores are not assessed completely independently from the level of intrinsic type of food/ method of handling risk.

- Generally the differences in the other compliance scores and intrinsic risk scores can explain the variation in CIM scores between different types of food establishments. The notable exceptions to this are schools/colleges and supermarkets/hypermarkets, which tend to have better CIM scores than would be expected given their other scores. Take-aways and mobile food units tend to have worse CIM scores than expected. This could possibly be related to the fact that schools/colleges and supermarkets/hypermarkets tend to be managed by large organisations, while take-aways and mobile food units are often managed by individuals. However there could be a number of other factors involved.

- After controlling for differences in the other compliance scores, intrinsic risk scores and types of food establishment, there remains considerable variation in CIM scores between local authorities. In particular establishments in more urban local authorities tend to be awarded worse CIM scores.

- More urban local authorities tend to have a higher level of enforcement activity. In part, this probably reflects lower assessed compliance rates among establishments in more urban local authorities.

[1] Lee-Woolf et al. (2015) Consistency in the delivery of official food safety controls: the role of organisational-level factors. Report for the FSA.

Contents

1. Background

1.1 Under the present Food Law Code of Practice framework, each rated food establishment is given a total risk score which determines how often it should be inspected/ be subject to other interventions (see Figure 1.1b). This total risk score is the sum of 8 separate components (risk scores, see Figure 1.1a).

- 4 components assess intrinsic risk arising from the nature of the business – the potential hazard.
- There are 3 components which assess level of compliance (see paragraph 1.2), which should be assessed independently from the intrinsic risk scores.
- The final component *risk of contamination* is related to both the intrinsic risk and level of compliance. There may be an intrinsic risk of cross contamination arising from the nature of the food activity but the risk may be negligible if the food premises is well managed, as assessed by the *Confidence in Management* (CIM) score.

Figure 1.1a – The risk scores

	Scores
Intrinsic risk scores:	
Type of food and method of handling (FMH)	5, 10, 30, 40
Method of processing	0, 20
Consumers at risk (CAR)	0, 5, 10, 15
Vulnerable groups (VG)	0, 22
Level of compliance scores:	
Level of compliance - hygiene	0, 5, 10, 15, 20, 25
Level of compliance - structural	0, 5, 10, 15, 20, 25
Confidence in management (CIM)	0, 5, 10, 20, 30
Other	
Risk of contamination	0, 20

Figure 1.1b – Risk ratings in England in 2013/14

Risk rating	Total risk score	Minimum intervention frequency
A	92 or higher	At least every 6 months
B	72 - 91	At least every 12 months
C	42 - 71	At least every 18 months
D	31 - 41	At least every 24 months
E	5 - 30	A programme of alternative enforcement strategies or interventions every three years

1.2 The three components which assess level of compliance are:

- 'Level of compliance – Hygiene': This assesses the level of compliance in terms of food handling and preparation
- 'Level of compliance – Structural': This assesses the level of compliance in terms of the hygiene of the food premises
- 'Confidence in Management': This assesses whether a business' food safety management/control procedures are appropriate, and is intended as a judgement of the likelihood of satisfactory compliance being maintained in the future.

In England, Wales and Northern Ireland these three scores are used as a part of the Food Hygiene Rating Scheme (FHRS), in deriving a food hygiene rating, as shown in Figure 1.2.

Figure 1.2 – How the FHRS tier is derived from the three compliance scores

Food hygiene rating	Description	Minimum criteria (sufficiently low scores) for inclusion in this tier
5	Very good	sum of scores <=15 ; max score <=5
4	Good	sum of scores <=20; max score <= 10
3	Generally satisfactory	sum of scores <=30; max score <= 10
2	Improvement necessary	sum of scores <= 40; max score <= 15
1	Major improvement necessary	sum of scores<=50; max score <= 20
0	Urgent improvement necessary	Otherwise

1.3 In order to deal with non-compliance there are a number of enforcement actions local authorities can take, these are summarised in Figure 1.3.

Figure 1.3 – Enforcement actions a local authority can take to deal with non-compliance

Type of Action	Purpose
Enforcement actions which can be applied to all types of food establishments in England	
Simple caution (see *Simple Cautions for Adult Offenders* for more details)	Formal warning given to an FBO who accepts that low-level non-compliance has occurred.
Hygiene Improvement Notice (HIN) (see regulation 6[1] for more details)	Formal action to secure compliance with the hygiene regulations[2] within a time limit (not being less than 14 days). HIN procedures would be inappropriate - where the contravention may be a continuing one e.g. personal cleanliness of staff - in transient situations e.g. one day festival
Voluntary closure	When the FBO agrees to cease trading to remove any health risk conditions and not re-open without the Competent Authority's prior approval. This may also involve voluntary procedures to remove food not suitable for human consumption from the food chain.
Hygiene Emergency Prohibition Notice (HEPN) (see regulation 8[1] for more details)	Served when there is an imminent risk of injury to health to immediately close the premises, or prevent the use of equipment, or the use of a process or treatment. The service of a HEPN is followed by an application to a Magistrates' Court for a Hygiene Emergency Prohibition Order.
Prosecution	The conduct of legal proceedings against an individual charged with the commission of a criminal offence.
Enforcement actions which in England are only applicable to approved premises A number of food establishments require approval to carry out certain high risk activities (see *Guidance for local authority authorised officers on the approval of establishments*). Premises who are granted approval to carry out such activities are referred to as approved premises.	
Remedial Action Notice (RAN) (see regulation 9[1] for more details)	A RAN may be served for the prohibition of the use of any equipment or any part of the establishment, the imposition of conditions upon, or prohibiting, any process and also allows for the rate of an operation to be reduced or, stopped completely. In England RANs may only be applied to approved premises.
Suspension/revocation of approval	Suspension or withdrawal of an establishment's approval or conditional approval. See paragraphs 128 – 144 *of Guidance for local authority authorised officers on the approval of establishments* for more details.
Seizure/detention of food	
Seizure of Food Notice (see regulations 25, 29[1] for more details)	The seizure of food which has not been produced, processed or distributed in compliance with the hygiene regulations[2]
Detention Notice (see regulations 10[1] for more details)	To require the detention of any animal or food for the purpose of examination in respect of establishments subject to approval.0

1. Food Safety and Hygiene (England) Regulations 2013
2. As defined by the Food Safety and Hygiene (England) Regulations 2013 – Regulation 2

2. Data considerations and variability between local authorities

Data considerations

2.1 The aim of this study was to investigate variation in food law enforcement between local authorities. Given the small number of local authorities to be used in the study it was important that they were selected to maximise the potential insight that could be gained from each of them, by making the study as focused as possible. It was therefore decided that the scope of this study should be refined to look at English local authorities alone, to avoid any potential confounding country level factors.

2.2 Local authorities are very diverse and not necessarily comparable to each other as they vary from large sparsely populated ones in rural areas to densely populated ones in major urban areas such as London or Greater Manchester. The 2011 Rural-Urban classification for local authorities[2] based on the 2011 Census provides a measure of how rural/urban a local authority is, based on 6 categories. These categories were aggregated to 4 categories for the purposes of this study, (as shown in Figure 2.1) in order to have a reasonable number of local authorities in each category, to allow a more robust analysis.

Figure 2.1 – The urban-rural classification used in this study

2011 Urban Rural Classification	Classification used in this study	Number of local authorities
Urban with Major Conurbation	Major urban	75
Urban with Minor Conurbation	Urban	9
Urban with City and Town	Urban	96
Urban with Significant Rural	Urban with significant rural	54
Largely Rural	Rural	41
Mainly Rural	Rural	49
Total		**324**

2.3 The design of the study was informed by Local Authority Enforcement Monitoring System (LAEMS) annual returns. The LAEMS data includes:

- The raw data on individual food establishments including the establishment type (take-aways, caring premises, supermarkets, manufacturers/ packers, etc.), interventions/ enforcements they were subject to, and each of their compliance and intrinsic risk scores.
- Less detailed aggregated headline figures signed-off by local authorities, which may not be completely consistent with the raw data on individual establishments.

[2] www.gov.uk/government/statistics/2011-rural-urban-classification-of-local-authority-and-other-higher-level-geographies-for-statistical-purposes

2.4 While the LAEMS data provides a rich data source for looking at variation in CIM scores the same cannot be said for enforcement activity. There are a number of reasons for this:

- In general the typical number of enforcement actions carried out by a local authority over the course of one year is very low and so can vary substantially from year to year. As such the figure for a single year for a given local authority may not be a very meaningful measure.
- The aggregated figures signed off by local authorities do not include any meaningful breakdowns of enforcement activity, e.g. by the level of compliance of the food establishment.

2.5 The raw establishment level figures may allow more meaningful breakdowns of enforcement activity to be produced. However:

- Given the small number of food establishments subject to an enforcement action, in a typical local authority each year, a discrepancy in the enforcement data between the raw establishment level data and the final signed off figures, even if small in absolute terms, may be large relative to the total amount of enforcement activity.
- The small number of enforcement actions in any one given year, means that we would need the local authority to have raw establishment level data which was consistent with its final signed-off figures over a number of successive years, so that it could be pooled to allow a more meaningful analysis.
- The establishment level data does not allow a meaningful comparison between level of compliance of individual food establishments, and the enforcement activity they were subject to. This is because the data only explicitly gives information on the assessed level of compliance at the end of the financial year on which the enforcement action was carried out.

2.6 For analysis of variation in the CIM scores local authorities were selected to ensure that their LAEMS establishment level data was sufficiently well aligned with their final signed off figures to enable a detailed analysis comparing CIM scores with other information about individual establishments using 2013/14 LAEMS data. For analysis of enforcement actions, since a single year's data was not necessarily meaningful when looking at individual local authorities, only those for which the final signed off figures could be used from the past three years (2010/11 to 2013/14) were included in the analysis. A summary of how many local authorities were used in the analysis presented in this paper is shown in Figure 2.2.

Figure 2.2 – The numbers of local authorities used in the analysis

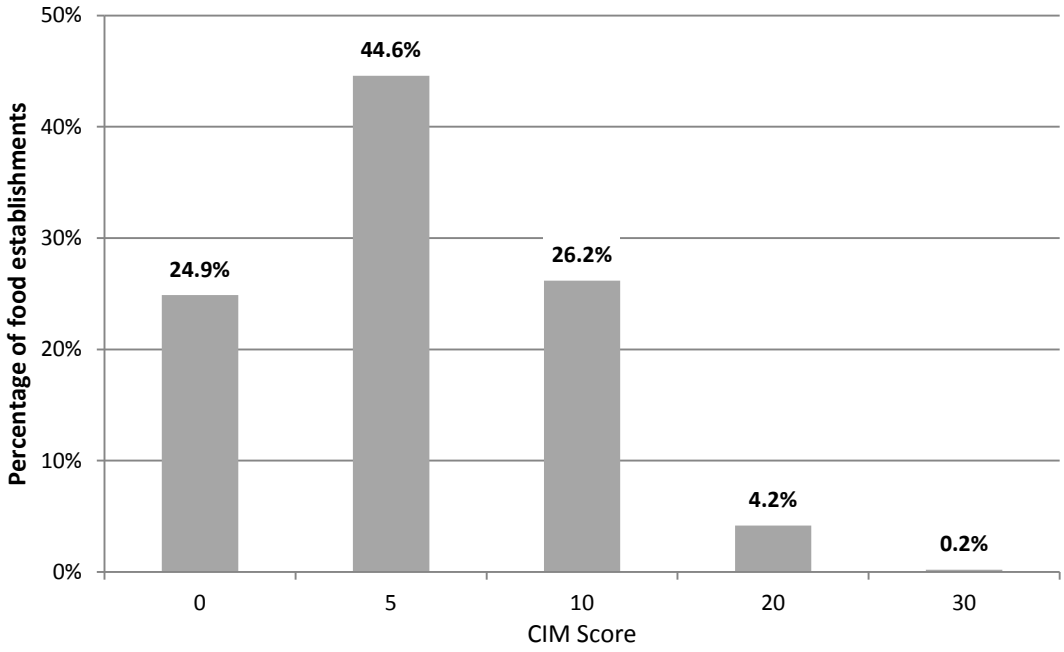
Urban-rural Classification	Total number of local authorities In England	Of which used for analysis/ modelling of CIM scores	Of which used for analysis of enforcement activity
Major urban	75	57	64
Urban	105	81	94
Urban with significant rural	54	41	46
Rural	90	71	76
Total	**324**	**250**	**280**

Variation between local authorities in CIM scores

2.7 The distribution of CIM scores for rated food establishments in England is shown in Figure 2.3. The FHRS tiers are based on the three compliance scores. For the purposes of looking at variation in CIM scores between LAs, the proportion of establishments with high CIM scores could be compared:

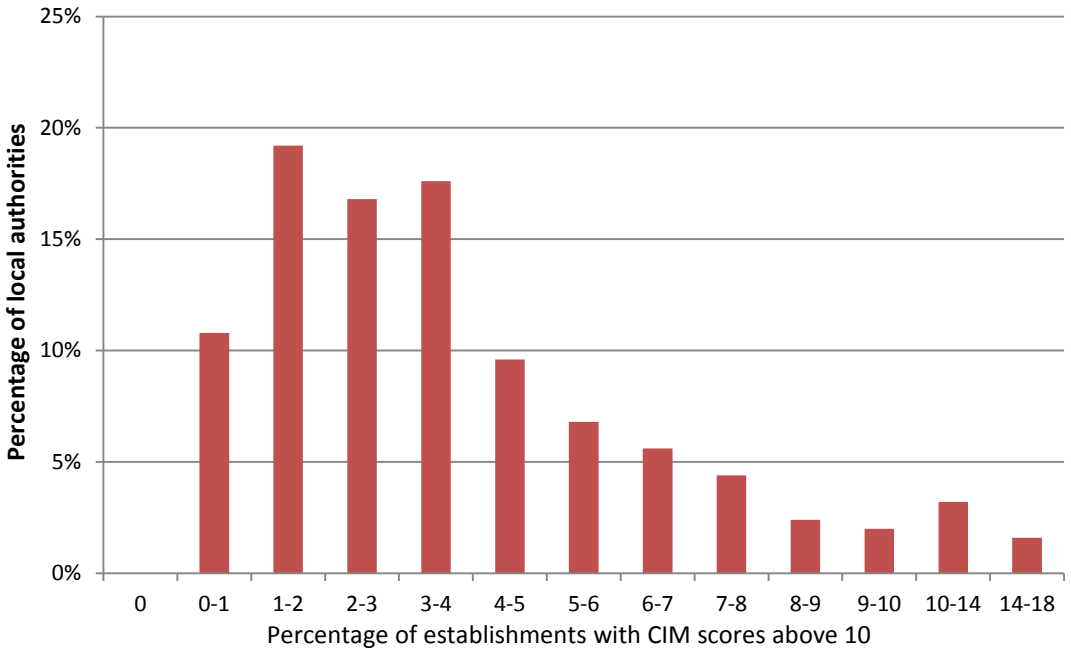
- Having a CIM score above 10 precludes an establishment from being broadly compliant (having an FHRS equivalent tier of "Generally satisfactory" or better). However only 4.4% of food establishments across the 250 LAs included in this analysis, fall into this category. Figure 2.4 shows how the proportion of establishments in this category varies between local authorities. For most local authorities (185 out of 250) no more than 5% of establishments were in this category. A few (12 out of 250) had over 10% of establishments in this category, but none had more than 18%.
- Having a CIM score greater than or equal to 10 precludes an establishment from having the top food hygiene rating of 5 ("Very good"). 30.5% of establishments have a CIM score in this range. However, as shown in Figure 2.5, this proportion varies considerably from one local authority to another. While for most local authorities (169 out of 250), 15-35% of establishments were in this category, for a few local authorities (12 out of 250) over half of establishments were in this category.

Figure 2.3 – The distribution of CIM scores among food establishments in England



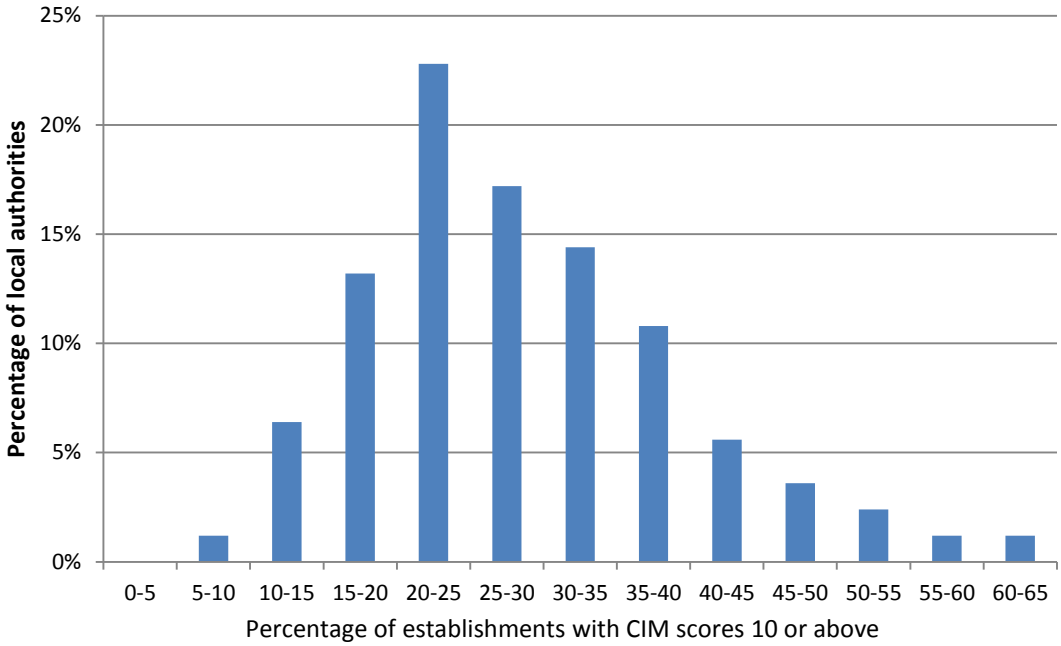
2.8 For the purposes of the study, we were interested in looking at variation between local authorities in the proportion of establishments with a high CIM score. A high CIM score needs to be defined in such a way that it allows us to identify discernible differences between local authorities. We therefore defined a high CIM score as being one above 10.

Figure 2.4 – The percentage of risk rated food establishments with a CIM scores above (worse than) 10: The distribution across local authorities in England



Basis: 250 out of 324 local authorities in England

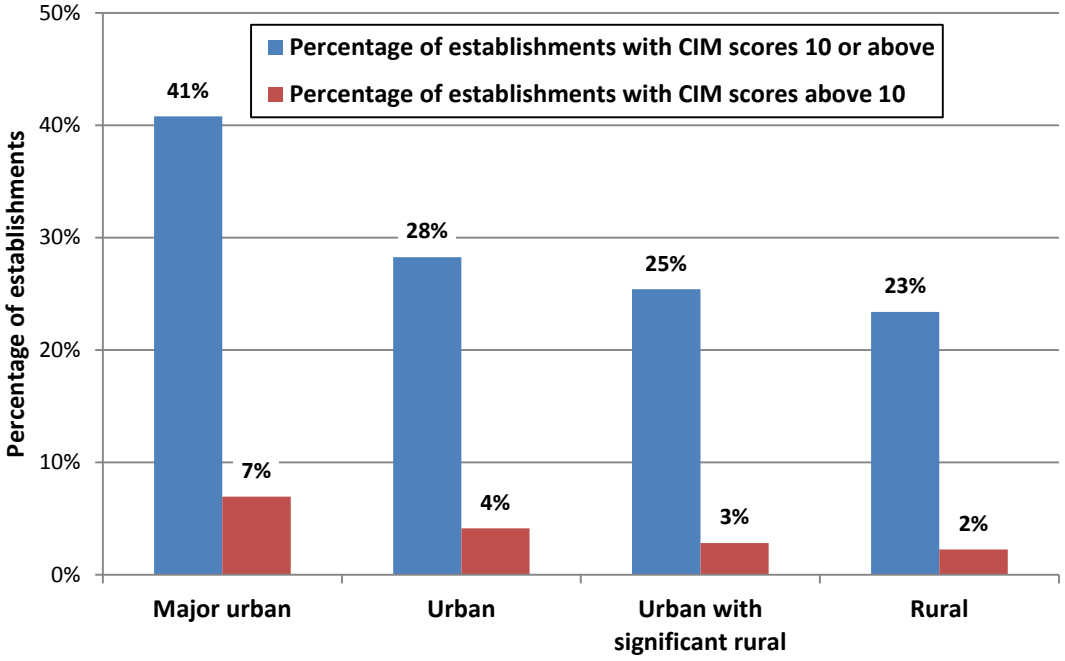
Figure 2.5 – The percentage of risk rated food establishments with a CIM score of 10 or above (worse): The distribution across local authorities in England



Basis: 250 out of 324 local authorities in England

2.9 Figure 2.6 shows how CIM scores vary according to how urban the local authority is. The proportion of establishments with high CIM scores (10 or above) tends to be higher for more urban local authorities compared to more rural ones. This trend is also reflected within regions as shown in Figure 2.7. In particular the major urban areas such as Greater London or the West Midlands built up area tend to have the highest proportion of establishments with high CIM scores.

Figure 2.6 – CIM scores given by local authorities in England by the urban-rural category of the local authority, 2013/14



Basis: 250 out of 324 local authorities in England

Figure 2.7 – The proportion of establishments with a CIM score of 10 or above, urban-rural category and region: Local authorities in England, 2013/14

	Major urban	Urban	Urban with significant rural	Rural	All
North	37%	30%	23%	24%	**31%**
Midlands and the East	39%	30%	28%	23%	**28%**
South		26%	25%	24%	**25%**
London	45%				**45%**
London fringe*	29%				**29%**
All England	**41%**	**28%**	**25%**	**23%**	**31%**

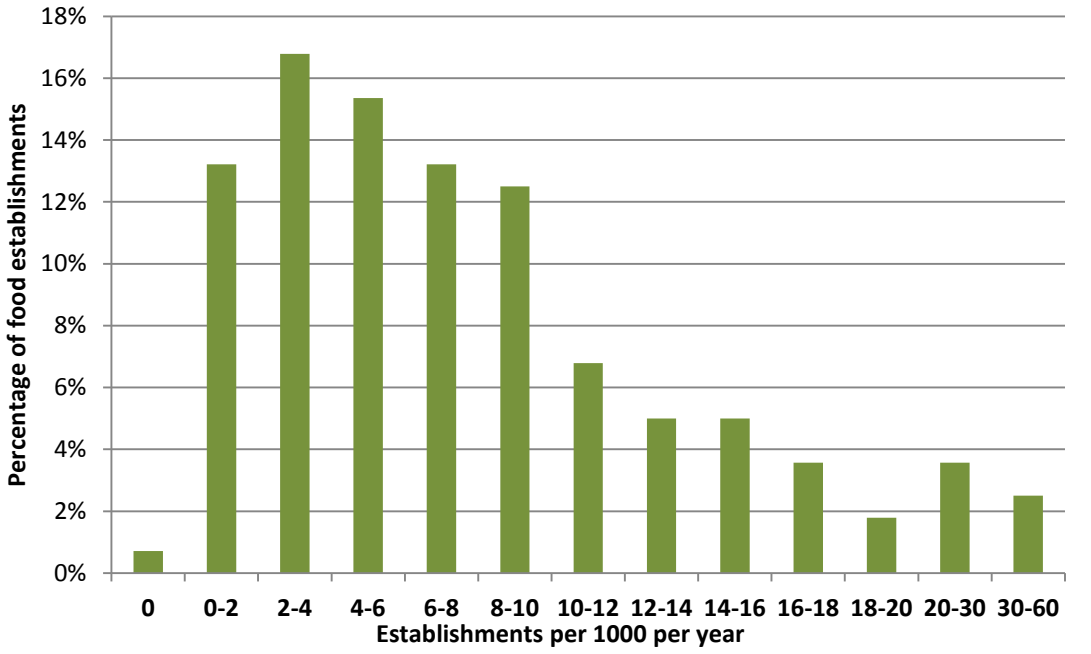
Basis: 250 out of 324 local authorities in England

***The major urban local authorities in the East and South East. These are the major urban local authorities surrounding London, e.g. *Three Rivers* and *Watford*.**

Variation between local authorities in enforcement activity

2.10 By far the most commonly used enforcement action (in terms of number of establishments to which it is applied each year) is the Hygiene Improvement Notice (HIN). Between 2011/12 and 2013/14, in English local authorities, an annual average of 9 out of every 1000 establishments was subject to a HIN. Figure 2.8 shows how this varied between local authorities. For most local authorities (71%) the annual average was greater than 0 and at most 10 per 1000 establishments. However for a few local authorities (6%), the rate exceeded 20 per 1000 establishments.

Figure 2.8 – The distribution of the annual average number of foods establishment per 1000, subject to an HIN; across local authorities in England: 2011/12 to 2013/14



Basis: 280 out of 324 local authorities in England

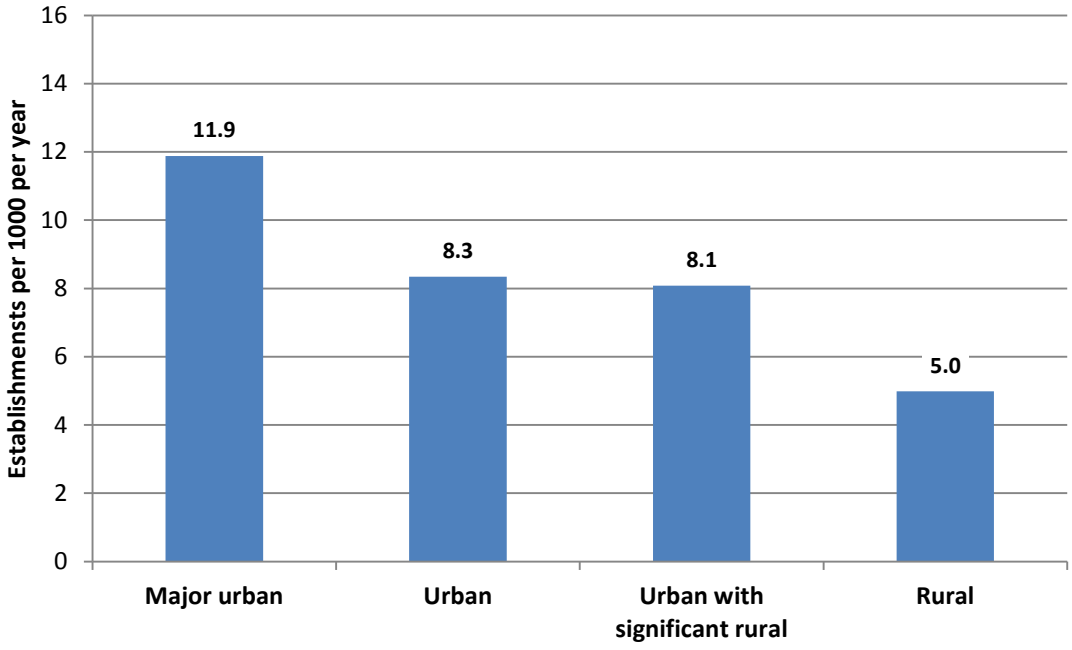
2.11 More urban local authorities tend to have a higher level of enforcement activity and this is reflected across the full range of enforcement actions, as shown in Figures 2.9 and 2.10. Among local authorities in major urban areas 12 establishments per 1000, on average, are subject to a HIN each year, compared to an average annual rate of 5 establishments per 1000 among rural local authorities. This probably, at least in part, reflects lower assessed compliance rates among establishments in more urban local authorities.

Figure 2.9 – The annual average number of food establishments per 1000 subject to a given type of enforcement action, by the urban-rural category of the local authority: Local authorities in England, 2011/12 to 2013/14

	Major urban	Urban	Urban with significant rural	Rural	All
Simple caution	0.6	0.6	0.5	0.3	**0.5**
HIN	11.9	8.3	8.1	5.0	**8.6**
Voluntary closure	2.2	1.7	0.8	0.6	**1.5**
HEPN	1.1	0.4	0.2	0.1	**0.5**
Prosecution	1.0	0.7	0.4	0.2	**0.6**
Seizure/ detention of food	2.2	0.9	0.3	0.3	**1.1**
% of rated establishments not broadly compliant	11%	8%	6%	5%	**8%**

Basis: 280 out of 324 local authorities in England

Figure 2.10 – The annual average number of food establishments per 1000 subject to an HIN, by the urban-rural category of the local authority: Local authorities in England, 2011/12 to 2013/14



Basis: 280 out of 324 local authorities in England

3. Statistical modelling of CIM scores

3.1 Differences in CIM scores between local authorities may be the result of differences in the characteristics of the food establishments within each local authority. It was necessary to control for this, to uncover what could potentially be genuine systematic differences between local authorities in how they apply the CIM score. Therefore, a statistical model was built using the LAEMS data for individual food establishments. The model used was a logistic regression model for the proportion of establishments with a CIM score of 10 or above. The model was built sequentially as shown in Figure 3.1. The results from the various models can be found in Annex 1.

Figure 3.1 – Summary of the logistic regression models fitted to the proportion of establishments with high CIM scores (10 or above)

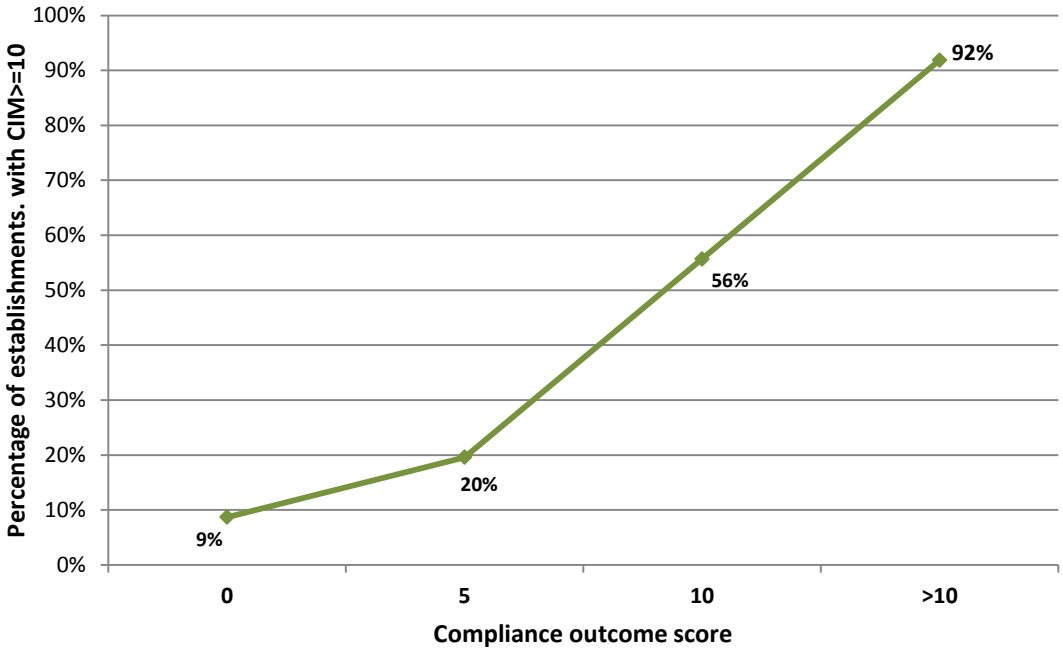
Model	Description
Model 0	The compliance scores model
Model 1	The risk scores model (compliance and intrinsic risk scores)
Model 2	The risk scores and establishment type model
Model 3	Risk scores, establishment type and urban-rural category of the local authority

Model 0: The compliance scores model

3.2 The two compliance scores "Level of compliance – hygiene" and "Level of compliance – structural" were fairly closely correlated with around 60% of establishments scoring exactly the same on both. It was therefore decided that for the purposes of the analysis the two should be combined to give a single measure of assessed compliance outcomes. The highest (worse) of the two scores was therefore used in the analysis. This will be referred to as the *compliance outcome* score.

3.3 The proportion of establishments with a CIM score of 10 or above appeared to be closely associated with the compliance outcome score. As might be expected the higher (worse) the assessed compliance outcomes in terms of food handling and the hygiene of the food premises, the higher (worse) the assessed level of confidence in management (see Figure 3.2). Hence, the proportion of establishments with a CIM score of 10 or above was modelled in terms of the *compliance outcome* score (Model 0).

Figure 3.2 – The proportion of establishments with a CIM score greater than or equal to 10, by the maximum (worse) of the hygiene and structural scores



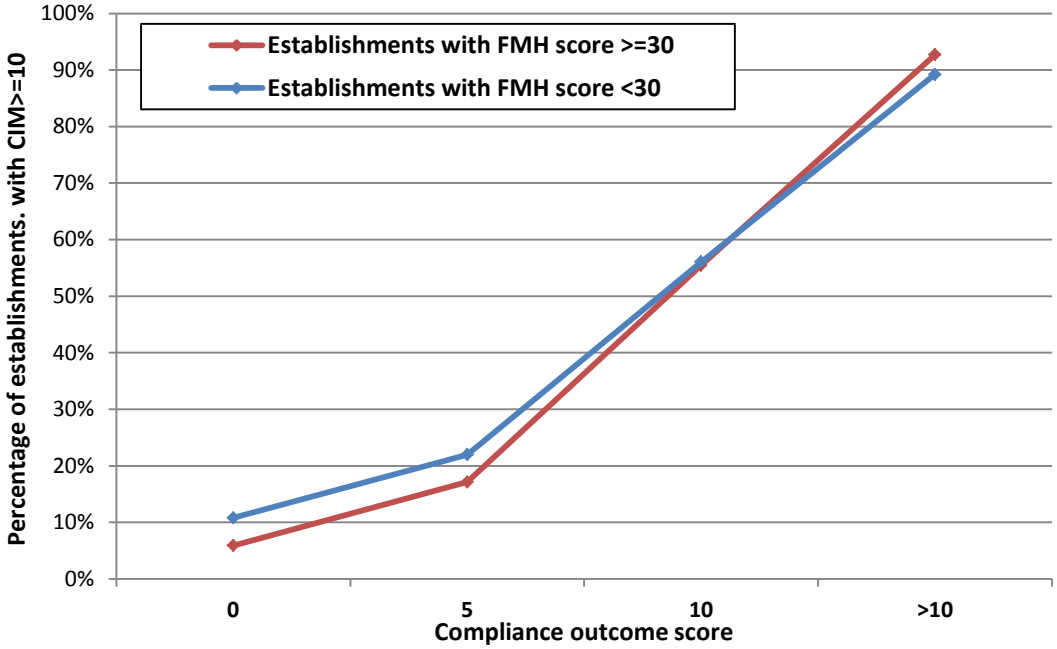
Model 1: The risk scores model

3.4 Model 0 could not fully explain the differences in CIM scores between the levels of some of the intrinsic risk scores. Therefore, Model 1 modelled the proportion of establishments with a CIM score of 10 or above, in terms of both the *compliance outcome* score and some of the intrinsic risk scores. There were found to be statistically significant effects from *Food and Method of Handing* (FMH), *Vulnerable Groups* (VG) and *Consumers at Risk* (CAR) scores.

3.5 There was a statistically significant interaction between the *Food and Method of Handing* (FMH) score and the *compliance outcome* score. The effect of having a higher FMH score appeared to vary according to the *compliance outcome* score (see Figure 3.3). It seems that:

- among the establishments with the best (lowest) *compliance outcome* scores, those involved in higher risk food activities tend to be given **better** (lower) CIM scores, than those involved in lower risk food activities
- among the establishments with the highest (worst) *compliance outcome* scores, those involved in higher risk food activities tend to be given **worse** (higher) CIM scores, than those involved in lower risk food activities

Figure 3.3 – The proportion of establishments with a CIM score greater than or equal to 10, by the *compliance outcome score* and the *Food and Method of Handling* (FMH) score



Compliance outcome score	Establishments with FMH<30	Establishments with FMH>=30	Difference
0	11%	6%	**-5%**
5	22%	17%	**-5%**
10	56%	55%	**-1%**
>10	89%	93%	**3%**

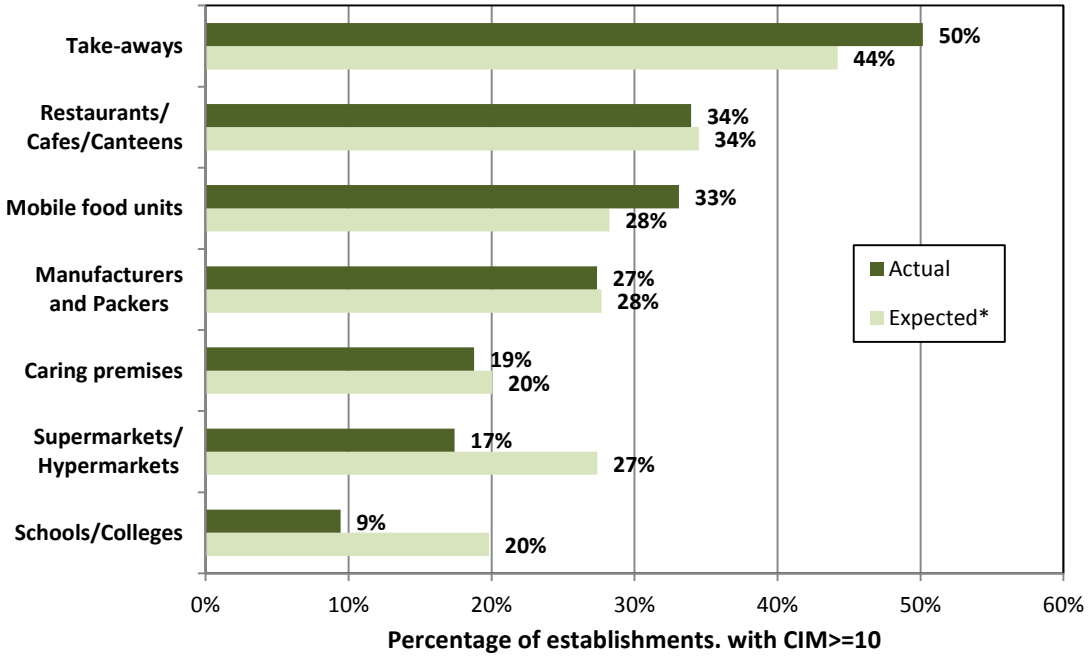
3.6 Looking at the intrinsic risk scores

- Comparing the CIM scores with the *Vulnerable Groups* (VG) intrinsic risk scores: Among establishments with a VG score of 0, 32% had a high CIM score (10 or above), compared to only 13% of establishments with a VG score of 22. This difference could only partly be explained by the fact that establishments with the higher VG score tend to have lower (better) *compliance outcome* scores.
- Comparing the CIM scores with the *Consumers at Risk* (CAR) intrinsic risk scores: Among establishments with a CAR score less than 10, 31% had a high CIM score (10 or more), compared to only 21% of establishments with a CAR score of 22.
- The effects of both scores were statistically significant even after controlling for differences in compliance outcome scores. While this may indicate some form of bias in how the CIM score is applied, it may be the case that food businesses that serve vulnerable consumers or have the potential to put a large number of consumers at risk, genuinely tend to have more enhanced food safety management/ control procedures in place.

Model 2: The risk scores and establishment type model

3.7 The risk scores model (Model 1) explains much of the variation in CIM scores between different types of food establishment. The notable exceptions to this were schools/colleges and supermarkets/hypermarkets (see Figure 3.4) for which a much lower proportion of establishments had a CIM score of 10 or above, than expected given their other risk scores. Among take-aways and mobile food units this proportion was higher than expected. This could possibly be related to the fact that schools/colleges and supermarkets/hypermarkets tend to be managed by large organisations, while take-aways and mobile food units are often managed by individuals.

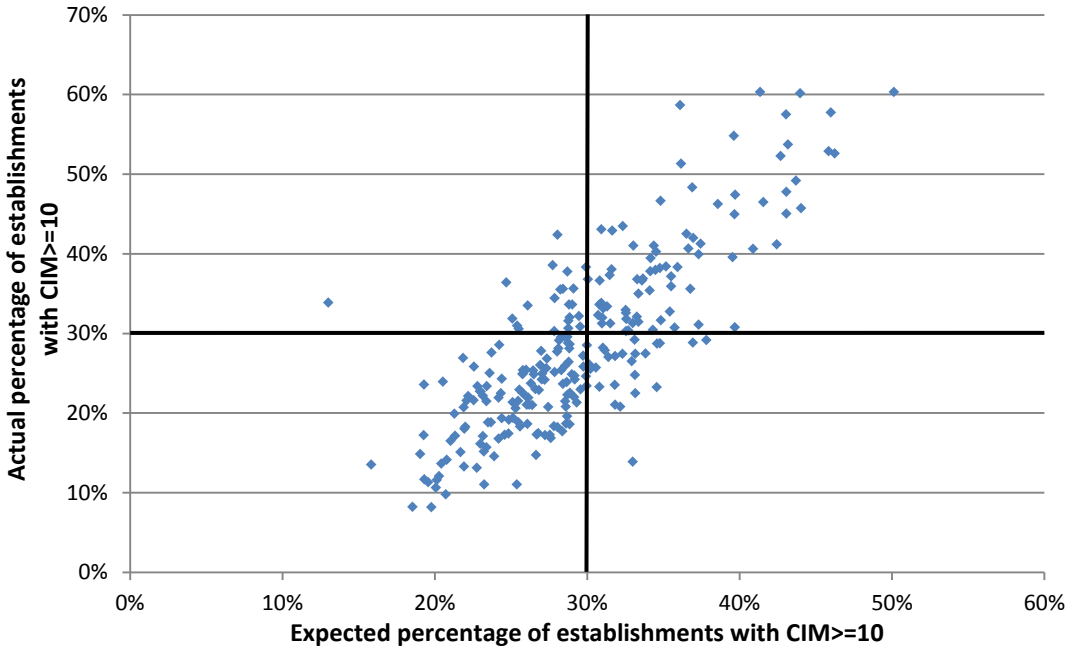
Figure 3.4 – The proportion of establishments with a CIM score greater than or equal to 10 – Actual; Expected* given the compliance outcome and intrinsic risk scores of individual establishments (Model 1): For selected establishment types



*This is based on the fitted values from Model 1 (logistic regression model of the proportion of establishments with a CIM scores >= 10, incorporating the maximum of the hygiene and structural scores, and the FMH, VG and CAR scores)

3.8 Establishment type was therefore included in the model alongside the risk scores (Model 2). Figure 3.5 shows the results from Model 2 for each of the 250 local authorities included in the analysis, comparing the actual proportions of rated food establishments with a CIM score of 10 or above, with the expected proportion given by Model 2. Model 2 explains much of the variation between local authorities, correctly identifying whether or not the proportion exceeds 30%, for just over four fifths (204 out of 250) local authorities.

Figure 3.5 – The proportion of establishments within each local authority, with a CIM score greater than or equal to 10 – Actual and Expected* (given the risk scores and types of establishment for each individual establishment)



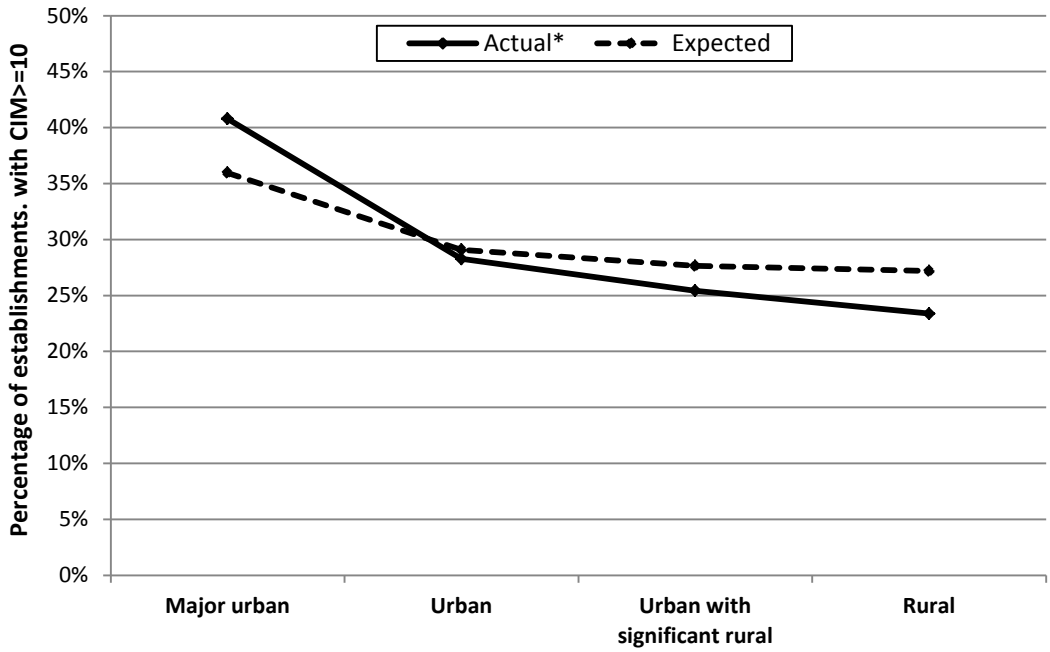
*This is based on the fitted values from Model 2 (logistic regression model of the proportion of establishments with a CIM scores >= 10, incorporating the maximum of the hygiene and structural scores; the FMH, VG and CAR scores; and the establishment type)

Model 3: The risk scores, establishment type and urban-rural category

3.9 As shown in Figure 2.6 more urban local authorities tend to award worse CIM scores than more rural ones. This trend is shown again by the solid line in Figure 3.6. The broken line shows the expected variation between more urban and more rural local authorities given variation in the risk scores and establishment types between urban and rural local authorities (according to Model 2). So some, but not all, of the urban-rural variation in CIM scores can be explained by the available information on the characteristics of individual food establishments. The urban-rural variation which remains unexplained is shown by the difference between the solid line and the broken line.

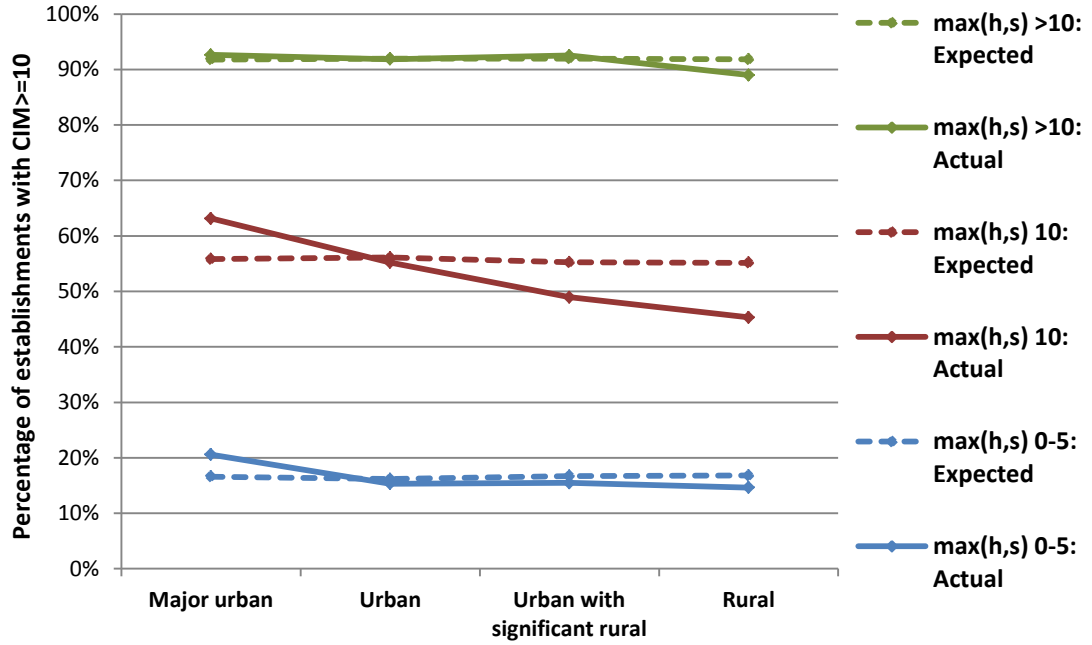
3.10 Figure 3.7 shows the same information as Figure 3.6, but separately for different compliance outcome score bands. The broken lines, which represent the expected variation between more urban and more rural local authorities within each compliance outcome score band, are broadly flat. This indicates that almost all of the explained urban-rural variation, reflects the variation in the other two compliance scores (hygiene and structural), with the variation in the other attributes (between urban and rural local authorities) not being large enough to make a discernible difference.

Figure 3.6 – The proportion of establishments with a CIM score greater than or equal to 10 – Actual; Expected* given their risk scores and establishment types (Model 2): by the urban-rural category of the local authority



*This is based on the fitted values from Model 2 (logistic regression model of the proportion of establishments with a CIM scores >= 10, incorporating the maximum of the hygiene and structural scores; the FMH, VG and CAR scores; and the establishment type)

Figure 3.7 – The proportion of establishments with a CIM score greater than or equal to 10 – Actual; Expected* given their risk scores and establishment types (Model 2): by the urban rural category of the local authority and the compliance outcome scores (the maximum of the hygiene and structural scores - max(h,s))



*This is based on the fitted values from Model 2 (logistic regression model of the proportion of establishments with a CIM scores >= 10, incorporating the maximum of the hygiene and structural scores; the FMH, VG and CAR scores; and the establishment type)

4. The design of the study[3]

4.1 Owing to various constraints it was only possible to include a small number of local authorities in the study. As discussed in paragraphs 2.3 and 2.6, while the LAEMS data provides a rich data source for looking at variation between local authorities in *Confidence in Management* (CIM) scoring, the potential for robust analysis of enforcement activity is far more limited. It was therefore decided that the study should be designed primarily to focus on variation between local authorities in their CIM scoring, while also trying to serve the secondary purpose of looking at variation in the approach taken to enforcement activity.

4.2 The risk scores and establishment type model for CIM scores (Model 2, see Section 3) allows us to control for differences in the characteristics of food establishments within the local authorities to uncover pairs of local authorities for which there may be a genuine systematic difference in how the two local authorities apply the CIM score.

4.3 Based on Model 2, pairs of local authorities could be identified which (given their risk scores / establishment types) we would expect to have almost the same proportion of CIM scores 10 or above, but where the actual proportion differs considerably between the two local authorities. We were able to identify such pairs of local authorities where both:

- were in the same urban-rural category
- were of the same local authority type (e.g. both unitary authorities or both metropolitan borough councils)
- were in close proximity to each other (in the same region, and often in same county sharing a boundary)

4.4 We were able to identify such pairs of local authorities for which there were large differences in enforcement activity based on looking at the annual average number of food establishments per 1000 subject to each type of enforcement action. The greatest differences in enforcement activity were usually in hygiene improvement notices, which is by far the most commonly used enforcement action. However there were also cases where there were large differences for some of the other types of enforcement activity as well.

4.5 For the purposes of the study it was decided that, as far as practicalities allowed, pairs of local authorities would be selected in accordance with criteria indicated in paragraphs 4.3 and 4.4. Such pairs were to be picked to reflect the full range on the urban-rural scale. For major urban local authorities, it was decided that, since London is often a special case, the major urban category would include both a London and a non-London pair. Ten pairs of local authorities would therefore be selected from within the following categories:

- Major urban London
- Major urban – non London
- Urban
- Urban with significant rural
- Rural

[3] Lee-Woolf et al. (2015) Consistency in the delivery of official food safety controls: the role of organisational-level factors. Report for the Food Standards Agency.

4.6 A within-category index of enforcement activity was created, whereby the estimated level of activity for each local authority was indexed against average for the given urban-rural category (assigned a value of 100). So a value less than 100 would indicate a lower than average level of enforcement activity within the given urban-rural category, and a value above 100 would indicate a higher than average level of activity. Figure 4.1 shows the values of the index for each of the pairs of local authorities selected for the study in the end. The key differences in the use of specific enforcement actions between the local authorities in each pair are also summarised in Figure 4.1.

Figure 4.1 - Summary of differences observed within case study pairs

Urban-rural classification	Case study reference	Difference between actual and expected % of premises scoring CIM ≥10 (in % points) – 2013/14[1]	Within category index of enforcement activity (based on the years 2011/12 to 2013/14[2])	Inconsistencies observed in the reported use of specific enforcement options
Major urban (London)	A	+11 to +13%-points	125-130	Relatively very high proportion of Seizures, Detentions and Surrenders of Food.
	B	- 8 to -10%-points	60-65	Relatively low proportion of Improvement Notices.
Major urban (Non-London)	A	+11 to +13%-points	110-115	Higher than average use of Improvement Notices.
	B	- 8 to -10%-points	85-90	Higher than average use of Improvement Notices. Relatively low proportion of Voluntary Closures.
Urban	A	+2 to +4%-points	15-20	Relatively low proportion of Improvement Notices.
	B	-14 to -16%-points	200-205	Relatively high proportion of Improvement Notices.
Urban (with significant rural areas)	A	-1 to +1%-points	170-175	Relatively high proportion of Improvement Notices.
	B	- 8 to -10%-points	60-65	Relatively low proportion of Improvement Notices.
Rural	A	-1 to +1%-points	205-210	Relatively high proportion of Improvement Notices and Voluntary Closures.
	B	-8 to -10%-points	45-50	Relatively low proportion of Improvement Notices.

1. In order to maintain the confidentiality of the local authorities involved in the study, scores have been allocated to bands three percentage points wide. For example, if an actual CIM score was 25%, compared to an expected 23%, this would be two percentage points higher than the expected value, and the local authority would be assigned to the +2 to +4 category.
2. As with CIM scoring, figures for the index of enforcement activity have been assigned to bands, here five point index intervals.

Annex 1 – Logistic regression models for the likelihood of a rated food establishment having a CIM score of 10 or above

	Model 0						Model 1				
	B	SE	Odds ratio (with 95% CI)				B	SE	Odds ratio (with 95% CI)		
			Upper	Estimate	Lower				Upper	Estimate	Lower
Intercept	-2.354	0.013	0.093	**0.095**	0.097		-2.059	0.016	0.124	**0.128**	0.132
Compliance outcome (CO) score = Maximum (hygiene score, structural score) - baseline: 0											
5	0.942	0.015	2.492	**2.564**	2.638		0.820	0.018	2.192	**2.269**	2.350
10	2.583	0.015	12.854	**13.233**	13.622		2.333	0.019	9.924	**10.305**	10.702
More than 10	4.778	0.029	112.331	**118.868**	125.785		4.213	0.049	61.361	**67.552**	74.367
Consumer at risk score - Baseline: less than 10											
10 and above							-0.480	0.022	0.593	**0.619**	0.646
Vulnerable groups score - Baseline: 0											
22							-0.775	0.022	0.441	**0.461**	0.480
Food and method of handling (FMH) score - Baseline FMH < 30 for the given level of CO											
FMH>=30: CO=0							-0.590	0.029	0.524	**0.555**	0.587
FMH>=30: CO=5							-0.236	0.012	0.771	**0.790**	0.808
FMH>=30: CO=10							0.000	0.014	0.974	**1.000**	1.028
FMH>=30: CO>=10							0.427	0.056	1.374	**1.533**	1.710
McFadden's pseudo R^2	**58.40%**						**60.40%**				
Chi squared	**90899, df = 3, p < 0.00001**						**94121, df = 9, p < 0.00001**				

	Model 2						Model 3				
	B	SE	Odds ratio (with 95% CI)				B	SE	Odds ratio (with 95% CI)		
			Upper	Estimate	Lower				Upper	Estimate	Lower
Intercept	-2.072	0.020	0.121	**0.126**	0.131		-2.340	0.021	0.092	**0.096**	0.100
Compliance outcome (CO) score = Maximum (hygiene score, structural score) - baseline: 0											
5	0.824	0.018	2.200	**2.279**	2.360		0.820	0.018	2.193	**2.271**	2.352
10	2.313	0.019	9.727	**10.105**	10.497		2.245	0.020	9.086	**9.441**	9.809
More than 10	4.162	0.049	58.287	**64.209**	70.733		4.068	0.050	53.048	**58.455**	64.414
Consumer at risk score - Baseline: less than 10											
10 and above	-0.440	0.024	0.614	**0.644**	0.675		-0.476	0.024	0.592	**0.621**	0.652
Vulnerable groups score - Baseline: 0											
22	-0.531	0.024	0.561	**0.588**	0.616		-0.569	0.024	0.540	**0.566**	0.593
Food and method of handling (FMH) score - Baseline FMH < 30 for the given level of CO											
FMH>=30: CO=0	-0.554	0.030	0.542	**0.575**	0.609		-0.570	0.030	0.534	**0.566**	0.599
FMH>=30: CO=5	-0.240	0.013	0.767	**0.787**	0.808		-0.251	0.013	0.758	**0.778**	0.799
FMH>=30: CO=10	-0.033	0.015	0.939	**0.968**	0.997		-0.013	0.015	0.958	**0.987**	1.017
FMH>=30: CO>=10	0.395	0.056	1.329	**1.484**	1.658		0.419	0.057	1.361	**1.521**	1.699
Establishment type - Baseline: Restaurants/café/canteen											
Take-away	0.390	0.016	1.430	**1.477**	1.526		0.401	0.017	1.446	**1.493**	1.543
Mobile food unit	0.322	0.025	1.315	**1.380**	1.448		0.393	0.025	1.411	**1.482**	1.555
Pub/Club	-0.041	0.016	0.930	**0.960**	0.990		0.020	0.016	0.989	**1.020**	1.053
Hotel/Guest house	0.048	0.024	1.002	**1.049**	1.099		0.181	0.024	1.144	**1.198**	1.256
Caring premises	-0.139	0.019	0.839	**0.871**	0.903		-0.090	0.019	0.881	**0.914**	0.949
School/College	-1.031	0.029	0.337	**0.356**	0.377		-0.994	0.029	0.350	**0.370**	0.392
Restaurants and caterers - other	0.007	0.016	0.975	**1.007**	1.040		0.053	0.016	1.021	**1.055**	1.089
Supermarket/Hypermarket	-0.722	0.034	0.454	**0.486**	0.520		-0.728	0.035	0.451	**0.483**	0.517
Small retailer	0.249	0.015	1.245	**1.283**	1.322		0.256	0.015	1.253	**1.291**	1.331
Retailer - Other	-0.152	0.023	0.821	**0.859**	0.897		-0.177	0.023	0.801	**0.838**	0.876
Manufacturers and packers	-0.009	0.029	0.936	**0.991**	1.049		0.123	0.029	1.068	**1.131**	1.198
Primary producers	-0.366	0.076	0.598	**0.694**	0.805		-0.179	0.076	0.720	**0.836**	0.971
Importers/Exporters	0.363	0.097	1.188	**1.437**	1.739		0.309	0.098	1.124	**1.362**	1.651
Distributors/Transporters	-0.020	0.039	0.908	**0.980**	1.058		-0.006	0.039	0.920	**0.994**	1.074
Urban-rural category - Baseline: Rural											
Urban with significant rural							0.112	0.015	1.086	**1.118**	1.151
Urban							0.214	0.012	1.211	**1.239**	1.267
Major urban							0.566	0.011	1.723	**1.761**	1.801
McFadden's pseudo R^2	**63.10%**						**64.90%**				
Chi squared	**98248, df = 23, p < 0.00001**						**101080, df = 26, p < 0.00001**				