

The Ghana 2013 Enterprise Surveys Data Set

I. Introduction

1. This document provides additional information on the data collected in Ghana between December 2012 and July 2014 as part of the Africa Enterprise Survey 2013, an initiative of the World Bank.

As part of its strategic goal of building a climate for investment, job creation, and sustainable growth, the World Bank has promoted improving business environments as a key strategy for development, which has led to a systematic effort in collecting enterprise data across countries. The Enterprise Surveys (ES) are an ongoing World Bank project in collecting both objective data based on firms' experiences and enterprises' perception of the environment in which they operate.

The Enterprise Surveys currently cover over 130,000 firms in 135 countries, of which 121 have been surveyed following the standard methodology. This allows for better comparisons across countries and across time. Data are used to create statistically significant business environment indicators that are comparable across countries. The Enterprise Surveys are also used to build a panel of enterprise data that will make it possible to track changes in the business environment over time and allow, for example, impact assessments of reforms.

The report outlines and describes the sampling design of the data, the data set structure as well as additional information that may be useful when using the data, such as information on non-response cases and the appropriate use of the weights.

II. Sampling Structure

2. The sample for Ghana was selected using stratified random sampling, following the methodology explained in the *Sampling Manual*¹. Stratified random sampling² was preferred over simple random sampling for several reasons³:

a. To obtain unbiased estimates for different subdivisions of the population with some known level of precision.

b. To obtain unbiased estimates for the whole population. The whole population, or universe of the study, is the non-agricultural economy. It comprises: all manufacturing sectors according to the group classification of ISIC Revision 3.1: (group D), construction sector (group F), services sector (groups G and H), and transport, storage, and communications sector (group I). Note that this definition excludes the following sectors: financial intermediation (group J), real estate and renting activities (group K, except sub-sector 72, IT, which was added to the population under study), and all public or utilities-sectors.

¹ The complete text can be found at http://www.enterprisesurveys.org/documents/Implementation_note.pdf

² A stratified random sample is one obtained by separating the population elements into non-overlapping groups, called strata, and then selecting a simple random sample from each stratum. (Richard L. Scheaffer; Mendenhall, W.; Lyman, R., "Elementary Survey Sampling", Fifth Edition).

³ Cochran, W., 1977, pp. 89; Lohr, Sharon, 1999, pp. 95

c. To make sure that the final total sample includes establishments from all different sectors and that it is not concentrated in one or two of industries/sizes/regions.

d. To exploit the benefits of stratified sampling where population estimates, in most cases, will be more precise than using a simple random sampling method (i.e., lower standard errors, other things being equal.)

e. Stratification may produce a smaller bound on the error of estimation than would be produced by a simple random sample of the same size. This result is particularly true if measurements within strata are homogeneous.

f. The cost per observation in the survey may be reduced by stratification of the population elements into convenient groupings.

3. Three levels of stratification were used in this country: industry, establishment size, and region. The original sample design with specific information of the industries and regions chosen is described in Appendix E.

4. Industry stratification was designed in the way that follows: the universe was stratified into four manufacturing industries (food, textiles and garments, chemicals and plastics, other manufacturing) and two service sectors (retail and other services).

5. For the Ghana Enterprise Survey (ES), size stratification was defined following the standardized definition for the rollout: small (5 to 19 employees), medium (20 to 99 employees), and large (more than 99 employees).

6. Regional stratification for the Ghana ES was defined in four regions: Accra, North (Kumasi and Tamale), Takoradi, and Tema.

III. Sampling implementation

7. Given the stratified design, sample frames containing a complete and updated list of establishments as well as information on all stratification variables (number of employees, industry, and region) are required to draw the sample. Great efforts were made to obtain the best source for these listings. However, the quality of the sample frames was not optimal and, therefore, some adjustments were needed to correct for the presence of ineligible units. These adjustments are reflected in the weights computation (*see below*).

8. TNS Opinion was hired to implement the Africa 2013 enterprise surveys roll out. In Ghana the local subcontractor was TNS RMS Ghana located in Accra.

9. For the Ghana ES, several sample frames were used. The first was supplied by the World Bank and consists of enterprises interviewed in Ghana 2007. The World Bank required that attempts should be made to re-interview establishments responding to the Ghana 2007 survey where they were within the selected geographical regions and met eligibility criteria. Due to the fact that the previous round of surveys seemed to have utilized different stratification criteria (or no stratification at all) and due to the prevalence of small firms and firms located in the capital city in the 2007 sample the following convention was used. The presence of panel firms was limited to a maximum of 50% of the achieved interviews in each cell. That sample is referred to as the Panel.

The second frame was constructed using different lists acquired from relevant institutions in Ghana.

The main lists used were obtained from the Ghana Statistical Service (GSS). These include:

- i) The 2012 Firm Registry. The registry lacked information on firm employee size.
- ii) The list of firms paying VAT. The VAT dataset included a variable on firms; turnover. The VAT dataset and Firm Registry were merged by using the firms' identification number (TIN). VAT information was not available for all firms in the Firm Registry.
- iii) The list of Large Tax Payers. The Large Tax Payers file also lacked information on firm employee size.

Since firm size was missing from all lists mentioned above, after having discussed with GSS and with the local contractor the following methods were used to predict firm size.

- All firms who were in the Firm Registry but not in the VAT dataset were considered to be micro firms and therefore not use in the current survey.
- Firm who were in the Firm Registry and in the VAT dataset were considered to be small firms
- Firms in the Large Tax Payers dataset medium or large firms. The original design was divided into two size groups: small firms and medium&large firms.

During fieldwork the GSS lists proved to be very inaccurate and not sufficient to reach the target sample design, As such they were complemented with additional lists of firms from the Ghana Chamber of Commerce and Industry and Business Associations. The list from the Ghana Chamber of Commerce lacked information on firm employee size or firm turnover.

The databases however contained the following information

- Detailed stratification variables on sector;
- Location identifiers- address, phone number, email;
- Contact name(s).

Finally, a block enumeration exercise was also undertaken in order to build an additional list. The block enumeration allowed to physically creating a list of establishments from which to sample from.

A total of 41 blocks were enumerated in the four locations included in the project out of the total 804 blocks identified. The enumeration was conducted without major problems in the time planned. The list of enumerated firms contained a total of 958 records eligible for main Enterprise Survey.

Counts from the sample frame used for the Ghana ES, which combines the records in the lists presented above, are shown in the table below.

Ghana ES, Sample Frame

Source: List of firms compiled for the purpose of the survey based on 2012, Ghana Statistical Service (GSS) Firm Registry, VAT firms, Large Tax Payers; Ghana Chamber of Commerce and Industry, Business Associations; Block enumeration.

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturing	Retail	Other Services	Grand Total
Accra	279	271	214	644	501	815	2724
Small (5 to 19)	211	226	181	391	386	374	1769
Medium (20 to 99)	1	2	6	55	16	26	106
Medium-Large (20+)	15	26	13	22	18	70	164
Large (100+)	10	7	3	32	3	7	62
Unknown Size	42	10	11	144	78	338	623
North	114	77	88	351	140	217	987
Small (5 to 19)	82	72	82	191	109	111	647
Medium (20 to 99)				4	8	12	24
Medium-Large (20+)	11		2	70		4	87
Large (100+)				2		4	6
Unknown Size	21	5	4	84	23	86	223
Takoradi	69	39	50	231	73	139	601
Small (5 to 19)	44	37	48	188	61	73	451
Medium (20 to 99)				2		8	10
Medium-Large (20+)	9			17		18	44
Large (100+)				1	1	3	5
Unknown Size	16	2	2	23	11	37	91
Tema	133	95	160	173	119	196	876
Small (5 to 19)	107	78	133	130	91	74	613
Medium (20 to 99)	5	6	8	14	10	40	83
Medium-Large (20+)	8	7	13	8	5	18	59
Large (100+)	5	2	2	4	2	7	22
Unknown Size	8	2	4	17	11	57	99
Grand Total	595	482	512	1399	833	1367	5188

Note: Unlike the standard ES, the universe for the Ghana ES is characterized by the presence of 5 size categories. The category medium&large was added as stratum in order to sample from the GSS large payers list, while the category "unknow size" was included in order to sample the firms in the Chamber of Commerce and Industry list

10. The enumerated establishments with 5 employees or more (fresh and panel) were then used as the sample frame for the Ghana Enterprise Survey with the aim of obtaining interviews at 720 establishments.

11. The quality of the frame was assessed at the onset of the project through visits to a random subset of firms and local contractor knowledge. The sample frame was not immune from the typical problems found in establishment surveys: positive rates of non-

eligibility, repetition, non-existent units, etc. In addition, the sample frame contains no telephone/fax numbers so the local contractor had to screen the contacts by visiting them.

12. Given the impact that non-eligible units included in the sample universe may have on the results, adjustments may be needed when computing the appropriate weights for individual observations. The percentage of confirmed non-eligible units as a proportion of the total number of sampled establishments contacted for the survey was 4.4% (199 out of 4,549 establishments)⁴.

Breaking down by industries and size, the following sample targets were achieved (using screener variables a3a, a4b and a6b):

Achieved sample

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturi ng	Retail	Other Services	Grand Total
Accra	24	10	34	118	70	99	355
Small (5-19)	18	2	29	70	56	55	230
Meduim (20-99)	4	5	4	32	12	31	88
Large (100+)	2	3	1	16	2	13	37
North	13	6	16	52	21	39	147
Small (5-19)	6	3	13	37	16	33	108
Meduim (20-99)	7	3	3	11	5	6	35
Large (100+)				4			4
Takoradi	3	1	3	15	9	28	59
Small (5-19)	2		3	11	8	17	41
Meduim (20-99)				4	1	11	16
Large (100+)	1	1					2
Tema	17	9	27	29	14	63	159
Small (5-19)	12	6	19	22	10	24	93
Meduim (20-99)	3	2	5	5	4	31	50
Large (100+)	2	1	3	2		8	16
Grand Total	57	26	80	214	114	229	720

IV. Data Base Structure:

13. The structure of the data base reflects the fact that 3 different versions of the survey instrument were used for all registered establishments. Questionnaires have common questions (*core* module) and respectfully additional manufacturing and retail specific questions. The eligible manufacturing industries have been surveyed using the **Manufacturing** questionnaire (includes the *core* module, plus manufacturing specific questions). Retail firms have been interviewed using the **Retail** questionnaire (includes the *core* module plus retail specific questions) and the residual eligible services have been covered using the core module only (**Other Services** questionnaire). Each variation of the questionnaire is identified by the index variable, *a0*.

⁴ Based on out of target contacts and impossible to contact establishments

14. All variables are named using, first, the letter of each section and, second, the number of the variable within the section, i.e. *a1* denotes section A, question 1 (some exceptions apply due to comparability reasons). Variable names preceded by a prefix “GHA” indicate questions specific to Ghana, therefore, they may not be found in the implementation of the rollout in other countries. All other suffixed variables are global and are present in all country surveys over the world. All variables are numeric with the exception of those variables with an “x” at the end of their names. The suffix “x” denotes that the variable is alpha-numeric.

15. There are 2 establishment identifiers, *idstd* and *id*. The first is a global unique identifier. The second is a country unique identifier. The variables *a2* (sampling region), *a6a* (sampling establishment’s size), and *a4a* (sampling sector) contain the establishment’s classification into the strata chosen for each country using information from the sample frame. The strata were defined according to the guidelines described above.

16. There are three levels of stratification: industry, size and region. Different combinations of these variables generate the strata cells for each industry/region/size combination. A distinction should be made between the variable *a4a* and *d1a2* (industry expressed as ISIC rev. 3.1 code). The former gives the establishment’s classification into one of the chosen industry-strata, whereas the latter gives the actual establishment’s industry classification (four digit code) in the sample frame.

17. All of the following variables contain information from the sampling frame. They may not coincide with the reality of individual establishments as sample frames may contain inaccurate information. The variables containing the sample frame information are included in the data set for researchers who may want to further investigate statistical features of the survey and the effect of the survey design on their results.

- a2* is the variable describing sampling regions

- a6a*: coded using the same standard for micro, small, medium, and large establishments as defined above. The code -9 was used to indicate units for which size was undetermined in the sample frame.

- a4a*: coded using ISIC codes for the chosen industries for stratification. These codes include most manufacturing industries (15 to 37), other manufacturing (2), retail (52), and (45, 50, 51, 55, 60, 63, 72) for other Services.

18. The surveys were implemented following a 2 stage procedure. Typically first a screener questionnaire is applied over the phone to determine eligibility and to make appointments. Then a face-to-face interview takes place with the Manager/Owner/Director of each establishment. However, the phone numbers were unavailable in the sample frame, and thus the enumerators applied the screeners in person. The variables *a4b* and *a6b* contain the industry and size of the establishment from the screener questionnaire. Variables *a8* to *a11* contain additional information and were also collected in the screening phase.

19. Note that there are variables for size (*l1*, *l6* and *l8*) that reflect more accurately the reality of each establishment. Advanced users are advised to use these variables for analytical purposes. Variables *l1*, *l6* and *l8* were designed to obtain a more accurate

measure of employment accounting for permanent and temporary employment. Special efforts were made to make sure that this information was not missing for most establishments.

20. Variables *a17x* gives interviewer comments, including problems that occurred during an interview and extraordinary circumstances which could influence results. Please note that sometimes this variable is removed due to privacy issues.

21. Note that the fiscal years vary by firm as there is no standard for all firms in Ghana. The start and end dates for the fiscal year for each firm can be found in the a20 variables in the dataset

V. Universe Estimates

21. Universe estimates for the number of establishments in each cell in Ghana were produced for the strict, weak and median eligibility definitions. The estimates were the multiple of the relative eligible proportions.

22. Appendix B shows the overall estimates of the numbers of establishments in Ghana based on the sample frame.

23. For some establishments where contact was not successfully completed during the screening process (because the firm has moved and it is not possible to locate the new location, for example), it is not possible to directly determine eligibility. Thus, different assumptions about the eligibility of establishments result in different adjustments to the universe cells and thus different sampling weights.

24. Three sets of assumptions on establishment eligibility are used to construct sample adjustments using the status code information.

25. Strict assumption: eligible establishments are only those for which it was possible to directly determine eligibility. The resulting weights are included in the variable *wstrict*.

$$\text{Strict eligibility} = (\text{Sum of the firms with codes } 1,2,3,4,\&16) / \text{Total}$$

26. Median assumption: eligible establishments are those for which it was possible to directly determine eligibility and those that rejected the screener questionnaire or an answering machine or fax was the only response. The resulting weights are included in the variable *wmedian*.

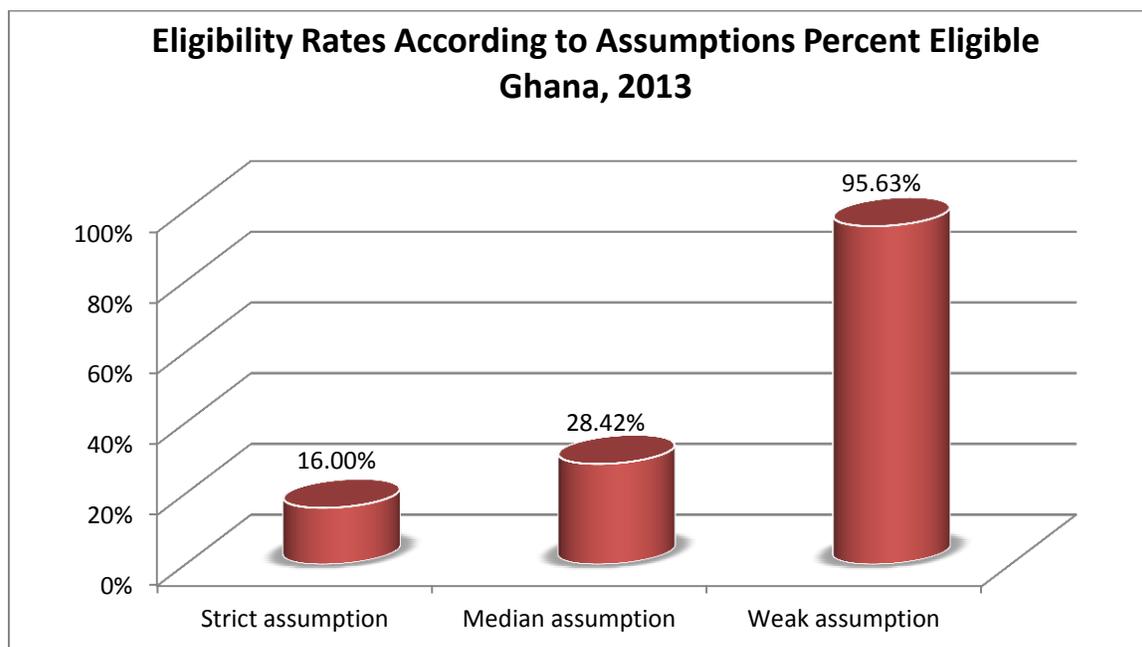
$$\text{Median eligibility} = (\text{Sum of the firms with codes } 1,2,3,4,16,10,11, \& 13) / \text{Total}$$

27. Weak assumption: in addition to the establishments included in points a and b, all establishments for which it was not possible to contact or that refused the screening questionnaire are assumed eligible. This definition includes as eligible establishments with dead or out of service phone lines, establishments that never answered the phone, and establishments with incorrect addresses for which it was impossible to find a new

address. Under the weak assumption only observed non-eligible units are excluded from universe projections. The resulting weights are included in the variable *wweak*.

$$\text{Weak eligibility} = (\text{Sum of the firms with codes } 1,2,3,4,16,91,92,93,10,11,12, \&13) / \text{Total}$$

28. The indicators computed for the Enterprise Survey website use the median weights. The following graph shows the different eligibility rates calculated for firms in the sample frame under each set of assumptions.



29. Universe estimates for the number of establishments in each industry-region-size cell in Ghana were produced for the strict, weak and median eligibility definitions. Appendix D shows the universe estimates of the numbers of registered establishments that fit the criteria of the Enterprise Surveys.

30. Once an accurate estimate of the universe cell projection was made, weights for the probability of selection were computed using the number of completed interviews for each cell.

VI. Weights

31. Since the sampling design was stratified and employed differential sampling, individual observations should be properly weighted when making inferences about the population. Under stratified random sampling, unweighted estimates are biased unless sample sizes are proportional to the size of each stratum. With stratification the probability of selection of each unit is, in general, not the same. Consequently, individual

observations must be weighted by the inverse of their probability of selection (probability weights or *pw* in Stata.)⁵

32. Special care was given to the correct computation of the weights. It was imperative to accurately adjust the totals within each region/industry/size stratum to account for the presence of ineligible units (the firm discontinued businesses or was unattainable, education or government establishments, establishments with less than 5 employees, no reply after having called in different days of the week and in different business hours, no tone in the phone line, answering machine, fax line⁶, wrong address or moved away and could not get the new references) The information required for the adjustment was collected in the first stage of the implementation: the screening process. Using this information, each stratum cell of the universe was scaled down by the observed proportion of ineligible units within the cell. Once an accurate estimate of the universe cell (projections) was available, weights were computed using the number of completed interviews.

33. Appendix C shows the cell weights for registered establishments in Ghana.

VII. Appropriate use of the weights

34. Under stratified random sampling weights should be used when making inferences about the population. Any estimate or indicator that aims at describing some feature of the population should take into account that individual observations may not represent equal shares of the population.

35. However, there is some discussion as to the use of weights in regressions (see Deaton, 1997, pp.67; Lohr, 1999, chapter 11, Cochran, 1953, pp.150). There is not strong large sample econometric argument in favor of using weighted estimation for a common population coefficient if the underlying model varies per stratum (stratum-specific coefficient): both simple OLS and weighted OLS are inconsistent under regular conditions. However, weighted OLS has the advantage of providing an estimate that is independent of the sample design. This latter point may be quite relevant for the Enterprise Surveys as in most cases the objective is not only to obtain model-unbiased estimates but also design-unbiased estimates (see also Cochran, 1977, pp 200 who favors the used of weighted OLS for a common population coefficient.)⁷

36. From a more general approach, if the regressions are descriptive of the population then weights should be used. The estimated model can be thought of as the relationship that would be expected if the whole population were observed.⁸ If the models are

⁵ This is equivalent to the weighted average of the estimates for each stratum, with weights equal to the population shares of each stratum.

⁶ For the surveys that implemented a screener over the phone.

⁷ Note that weighted OLS in Stata using the command `regress` with the option of weights will estimate wrong standard errors. Using the Stata survey specific commands `svy` will provide appropriate standard errors.

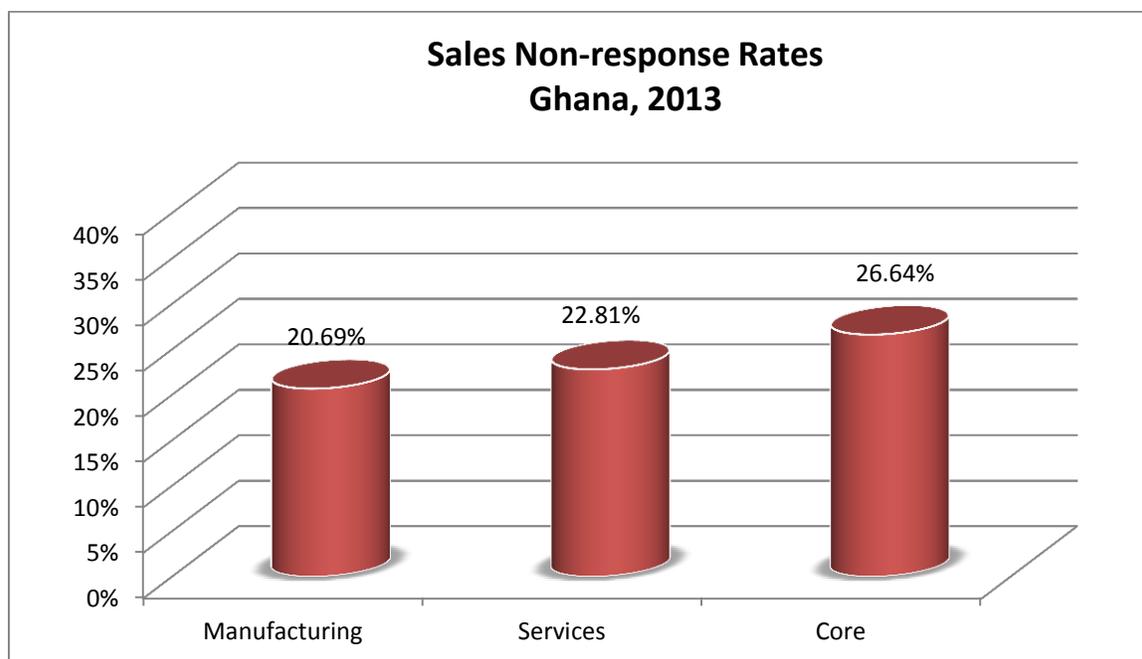
⁸ The use weights in most model-assisted estimations using survey data is strongly recommended by the statisticians specialized on survey methodology of the JPSM of the University of Michigan and the University of Maryland.

developed as structural relationships or behavioral models that may vary for different parts of the population, then, there is no reason to use weights.

VIII. Non-response

37. Survey non-response must be differentiated from item non-response. The former refers to refusals to participate in the survey altogether whereas the latter refers to the refusals to answer some specific questions. Enterprise Surveys suffer from both problems and different strategies were used to address these issues.

38. Item non-response was addressed by two strategies:
a- For sensitive questions that may generate negative reactions from the respondent, such as corruption or tax evasion, enumerators were instructed to collect the refusal to respond as a different option from don't know (-7).
b- Establishments with incomplete information were re-contacted in order to complete this information, whenever necessary. However, there were clear cases of low response. The following graph shows non-response rates for the sales variable, *d2*, by sector. Please, note that the coding utilized in this dataset does not allow us to differentiate between "Don't know" and "refuse to answer", thus the non-response in the charts below reflect both categories (DKs and NAs).



39. Survey non-response was addressed by maximizing efforts to contact establishments that were initially selected for interview. Attempts were made to contact the establishment for interview at different times/days of the week before a replacement establishment (with similar strata characteristics) was suggested for interview. Survey non-response did occur but substitutions were made in order to potentially achieve strata-specific goals. Further research is needed on survey non-response in the Enterprise Surveys regarding potential introduction of bias.

40. As the following graph shows, the number of interviews per contacted establishments was 0.16⁹. This number is the result of two factors: explicit refusals to participate in the survey, as reflected by the rate of rejection (which includes rejections of the screener and the main survey) and the quality of the sample frame, as represented by the presence of ineligible units. The number of rejections per contact was 0.12.



41. Details on the rejection rate, eligibility rate, and item non-response are available at the level strata. This report summarizes these numbers to alert researchers of these issues when using the data and when making inferences. Item non-response, selection bias, and faulty sampling frames are not unique to Ghana. All enterprise surveys suffer from these shortcomings, but in very few cases they have been made explicit.

References:

Cochran, William G., Sampling Techniques, 1977.
Deaton, Angus, The Analysis of Household Surveys, 1998.
Levy, Paul S. and Stanley Lemeshow, Sampling of Populations: Methods and Applications, 1999.
Lohr, Sharon L. Sampling: Design and Techniques, 1999.
Scheaffer, Richard L.; Mendenhall, W.; Lyman, R., Elementary Survey Sampling, Fifth Edition, 1996.

⁹ The estimate is based on the total no. of firms contacted including ineligible establishments.

Appendix A

Status Codes Enterprise Survey (ES):

	GHANA Fresh	GHANA Panel	GHANA TOTAL
1. Eligible establishment (Correct name and address)	668	23	691
2. Eligible establishment (Different name but same address - the new firm/establishment bought the original firm/establishment)	2	0	2
3. Eligible establishment (Different name but same address - the firm/establishment changed its name)	22	5	27
4. Eligible establishment (Wrong address - the firm/establishment has changed address and the address could be found)	5	3	8
16. Panel firm - now less than five employees	0	0	0
5. The establishment has less than 5 permanent full time employees	10	0	10
6. The firm discontinued businesses	89	2	91
7. Not a business: private household	8	0	8
8. Ineligible activity: education, agriculture, finances, governments...	41	4	45
91. No reply (<i>after having called in different days of the week and in different business hours</i>)	1064	9	1073
92. Line out of order	559	51	610
93. No tone	343	2	345
94. Phone number does not exist	728	260	988
10. Answering machine	4	0	4
11. Fax line - data line	1	0	1
12. Wrong address/ moved away and could not get the new references	41	0	41
13. Refuses to answer the screener	550	10	560
14. In process (<i>the establishment is being called/ is being contacted - previous to ask the screener</i>)	0	0	0
151. Out of target - outside the covered regions, firm moved abroad	45	0	45
152. Out of target - firm moved abroad	0	0	0
153. Out of target - Not registered with statistical agency	0	0	0
	4180	369	4549

Response Outcomes Enterprise (ES) Survey:

	GHANA Fresh	GHANA Panel	GHANA TOTAL
Sample target	641	79	720
Complete interviews (Total)	689	31	720
Incomplete interviews	0	0	0
Elegible in process	3	0	3
Refusals	5	0	5
Ineligible	148	6	154
Impossible to contact	2740	322	3062
Out of target	45	0	45
Refusal to the Screener	550	10	560
	4180	369	4549

Response rate	55%	76%	56%
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Out of target + impossible to contact	69%	89%	71%
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Impossible to contact	66%	87%	67%
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Appendix B

Universe Estimates Ghana:

Source: List of firms compiled for the purpose of the survey based on 2012, Ghana Statistical Service (GSS) Firm Registry, VAT firms, Large Tax Payers; Ghana Chamber of Commerce and Industry, Business Associations; Block enumeration.

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Unknown Size	8	2	4	17	11	57	99
Grand Total	595	482	512	1399	833	1367	5188

Appendix C

Strict Cell Weights Ghana:

Fresh Enterprise Survey

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturing	Retail	Other Services
Accra						
Small (5 to 19)	1.00	1.57	1.34	1.00	1.15	1.70
Medium (20 to 99)	1.00	1.00	1.16	1.00	1.08	1.00
Medium-Large (20+)	2.50	1.00	1.59	1.00	1.03	1.00
Large (100+)	0.00	0.00	0.00	1.26	1.43	1.00
Unknown Size	1.00	1.00	0.00	1.27	1.00	3.33
North						
Small (5 to 19)	1.05	1.71	1.00	1.24	1.00	1.22
Medium (20 to 99)	0.00	0.00	0.00	0.00	0.00	1.00
Medium-Large (20+)	2.17		1.00	1.79		0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	1.00
Unknown Size	1.00	0.00	1.00	1.00	1.00	1.00
Takoradi						
Small (5 to 19)	4.74	3.98	1.00	1.69	1.28	1.00
Medium (20 to 99)	0.00	0.00	0.00	0.00	0.00	1.00
Medium-Large (20+)	1.00			1.26		2.57
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	1.00	0.00	0.00	1.09	1.00	1.00
Tema						
Small (5 to 19)	1.78	1.14	1.37	1.26	3.10	1.04
Medium (20 to 99)	1.23	1.00	2.90	1.49	1.35	1.57
Medium-Large (20+)	0.00	1.00	3.98	1.94	1.00	1.00
Large (100+)	1.08	1.00	1.27	0.00	1.19	1.00
Unknown Size	1.00	0.00	0.00	0.00	0.00	1.40

Panel Enterprise Survey

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturing	Retail	Other Services
Accra						
Small (5 to 19)	1.00	1.00	0.00	1.29	0.00	1.69
Medium (20 to 99)	0.00	0.00	1.00	2.15	0.00	1.00
Medium-Large (20+)	0.00	0.00	0.00	0.00	0.00	0.00
Large (100+)	0.00	1.57	0.00	1.36	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00
North						
Small (5 to 19)	0.00	0.00	0.00	1.00	1.00	1.09
Medium (20 to 99)	0.00	0.00	0.00	0.00	1.00	1.00
Medium-Large (20+)	0.00		0.00	0.00		0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00
Takoradi						
Small (5 to 19)	0.00	0.00	0.00	1.61	1.00	1.00
Medium (20 to 99)	0.00	0.00	0.00	1.46	0.00	0.00
Medium-Large (20+)	0.00			0.00		0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00
Tema						
Small (5 to 19)	0.00	0.00	0.00	0.00	0.00	0.00
Medium (20 to 99)	0.00	0.00	0.00	1.00	0.00	0.00
Medium-Large (20+)	0.00	0.00	0.00	0.00	0.00	0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00

Median Cell Weights Ghana:

Fresh Enterprise Survey

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturing	Retail	Other Services
Accra						
Small (5 to 19)	1.98	3.10	2.27	1.62	1.86	3.25
Medium (20 to 99)	1.00	1.00	1.52	1.24	1.36	1.14
Medium-Large (20+)	6.45	1.39	3.52	1.62	2.18	1.92
Large (100+)	0.00	0.00	0.00	1.71	1.80	1.00
Unknown Size	1.14	1.00	0.00	3.43	1.78	9.92
North						
Small (5 to 19)	1.77	2.88	1.37	1.84	1.16	2.00
Medium (20 to 99)	0.00	0.00	0.00	0.00	0.00	1.00
Medium-Large (20+)	4.79		1.00	3.47		0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	1.00
Unknown Size	1.15	0.00	1.00	1.01	2.13	2.56
Takoradi						
Small (5 to 19)	8.90	7.46	1.36	2.79	1.98	1.00
Medium (20 to 99)	0.00	0.00	0.00	0.00	0.00	1.00
Medium-Large (20+)	1.41			2.73		6.10
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	1.00	0.00	0.00	2.79	1.46	2.37
Tema						
Small (5 to 19)	3.26	2.09	2.17	2.04	4.68	1.85
Medium (20 to 99)	1.75	1.16	3.54	1.87	1.58	2.17
Medium-Large (20+)	0.00	1.16	8.19	4.09	1.41	1.39
Large (100+)	1.55	1.23	1.56	0.00	1.40	1.00
Unknown Size	1.51	0.00	0.00	0.00	0.00	3.88

Panel Enterprise Survey

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturing	Retail	Other Services
Accra						
Small (5 to 19)	2.14	1.00	0.00	1.41	0.00	2.58
Medium (20 to 99)	0.00	0.00	1.00	1.69	0.00	1.00
Medium-Large (20+)	0.00	0.00	0.00	0.00	0.00	0.00
Large (100+)	0.00	2.71	0.00	1.87	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00
North						
Small (5 to 19)	0.00	0.00	0.00	1.00	1.31	1.46
Medium (20 to 99)	0.00	0.00	0.00	0.00	1.00	1.00
Medium-Large (20+)	0.00		0.00	0.00		0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00
Takoradi						
Small (5 to 19)	0.00	0.00	0.00	1.92	1.29	1.17
Medium (20 to 99)	0.00	0.00	0.00	1.25	0.00	0.00
Medium-Large (20+)	0.00			0.00		0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00
Tema						
Small (5 to 19)	0.00	0.00	0.00	0.00	0.00	0.00
Medium (20 to 99)	0.00	0.00	0.00	1.00	0.00	0.00
Medium-Large (20+)	0.00	0.00	0.00	0.00	0.00	0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00

Weak Cell Weights Ghana:

Fresh Enterprise Survey

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturing	Retail	Other Services
Accra						
Small (5 to 19)	6.76	10.81	6.23	5.47	5.71	10.34
Medium (20 to 99)	1.00	1.00	1.96	1.96	1.95	1.70
Medium-Large (20+)	13.77	3.03	6.06	3.41	4.18	3.81
Large (100+)	0.00	0.00	0.00	3.02	2.89	1.00
Unknown Size	6.74	4.89	0.00	20.04	9.49	54.66
North						
Small (5 to 19)	5.84	9.74	3.64	6.02	3.45	6.14
Medium (20 to 99)	0.00	0.00	0.00	0.00	0.00	1.11
Medium-Large (20+)	9.90		1.00	7.09		0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	1.26
Unknown Size	6.61	0.00	3.84	5.73	10.98	13.64
Takoradi						
Small (5 to 19)	40.11	34.29	4.94	12.42	7.99	3.30
Medium (20 to 99)	0.00	0.00	0.00	0.00	0.00	1.87
Medium-Large (20+)	3.97			7.58		15.99
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	4.93	0.00	0.00	21.51	10.28	17.23
Tema						
Small (5 to 19)	9.68	6.33	5.18	5.96	12.45	5.10
Medium (20 to 99)	2.44	1.65	3.96	2.57	1.97	2.81
Medium-Large (20+)	0.00	2.20	12.23	7.50	2.34	2.40
Large (100+)	2.41	1.96	1.96	0.00	1.95	1.13
Unknown Size	7.77	0.00	0.00	0.00	0.00	18.60

Panel Enterprise Survey

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturing	Retail	Other Services
Accra						
Small (5 to 19)	23.66	2.00	0.00	17.76	0.00	49.50
Medium (20 to 99)	0.00	0.00	4.06	7.66	0.00	5.02
Medium-Large (20+)	0.00	0.00	0.00	0.00	0.00	0.00
Large (100+)	0.00	2.18	0.00	6.44	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00
North						
Small (5 to 19)	0.00	0.00	0.00	8.84	16.32	26.23
Medium (20 to 99)	0.00	0.00	0.00	0.00	1.03	5.11
Medium-Large (20+)	0.00		0.00	0.00		0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00
Takoradi						
Small (5 to 19)	0.00	0.00	0.00	13.07	9.18	12.10
Medium (20 to 99)	0.00	0.00	0.00	3.06	0.00	0.00
Medium-Large (20+)	0.00			0.00		0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00
Tema						
Small (5 to 19)	0.00	0.00	0.00	0.00	0.00	0.00
Medium (20 to 99)	0.00	0.00	0.00	1.00	0.00	0.00
Medium-Large (20+)	0.00	0.00	0.00	0.00	0.00	0.00
Large (100+)	0.00	0.00	0.00	0.00	0.00	0.00
Unknown Size	0.00	0.00	0.00	0.00	0.00	0.00

Appendix D

Strict Universe Estimates

Fresh Enterprise Survey

			Other				
	Food	Chemicals & Plastic	Metals & Machinery	Manufacturing	Retail	Other Services	Grand Total
Accra	36	42	39	97	86	107	407
Small (5 to 19)	26	31	35	56	64	51	263
Medium (20 to 99)	1	1	1	16	9	12	40
Medium-Large (20+)	3	8	3	6	4	17	41
Large (100+)	0	0	0	10	1	7	19
Unknown Size	6	2	0	9	8	20	45
North	17	12	23	59	23	31	164
Small (5 to 19)	12	12	20	29	21	16	109
Medium (20 to 99)	0	0	0	0	0	6	6
Medium-Large (20+)	2		2	16		0	20
Large (100+)	0	0	0	0	0	3	3
Unknown Size	3	0	1	14	2	6	26
Takoradi	10	4	9	26	9	26	83
Small (5 to 19)	5	4	9	22	8	17	64
Medium (20 to 99)	0	0	0	0	0	4	4
Medium-Large (20+)	2			3		3	7
Large (100+)	0	0	0	0	0	0	0
Unknown Size	3	0	0	1	1	2	7
Tema	23	21	45	35	32	54	209
Small (5 to 19)	18	14	34	25	22	15	127
Medium (20 to 99)	2	3	6	7	7	22	47
Medium-Large (20+)	0	3	4	2	2	7	18
Large (100+)	2	1	1	0	1	6	12
Unknown Size	1	0	0	0	0	4	5
Grand Total	85	79	116	216	150	217	864

Panel Enterprise Survey

		Other						
	Food	Chemicals & Plastic	Metals & Machinery	Manufacturing	Retail	Other Services	Grand Total	
Accra	1	6	1	13	0	3	23	
Small (5 to 19)	1	1	0	5	0	2	9	
Medium (20 to 99)	0	0	1	6	0	1	8	
Medium-Large (20+)	0	0	0	0	0	0	0	
Large (100+)	0	5	0	1	0	0	6	
Unknown Size	0	0	0	0	0	0	0	
North	0	0	0	5	3	2	10	
Small (5 to 19)	0	0	0	5	2	1	8	
Medium (20 to 99)	0	0	0	0	1	1	2	
Medium-Large (20+)	0		0	0		0	0	
Large (100+)	0	0	0	0	0	0	0	
Unknown Size	0	0	0	0	0	0	0	
Takoradi	0	0	0	3	1	1	5	
Small (5 to 19)	0	0	0	2	1	1	4	
Medium (20 to 99)	0	0	0	1	0	0	1	
Medium-Large (20+)	0			0		0	0	
Large (100+)	0	0	0	0	0	0	0	
Unknown Size	0	0	0	0	0	0	0	
Tema	0	0	0	1	0	0	1	
Small (5 to 19)	0	0	0	0	0	0	0	
Medium (20 to 99)	0	0	0	1	0	0	1	
Medium-Large (20+)	0	0	0	0	0	0	0	
Large (100+)	0	0	0	0	0	0	0	
Unknown Size	0	0	0	0	0	0	0	
Grand Total	1	6	1	22	4	6	40	

Median Universe Estimates

Fresh Enterprise Survey

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturing	Retail	Other Services	Grand Total
Accra	66	76	67	158	140	210	718
Small (5 to 19)	51	62	59	91	104	98	465
Medium (20 to 99)	1	1	2	20	11	14	48
Medium-Large (20+)	6	11	7	10	9	33	76
Large (100+)	0	0	0	14	2	7	22
Unknown Size	7	2	0	24	14	59	107
North	28	20	30	88	29	50	245
Small (5 to 19)	19	20	27	42	24	26	160
Medium (20 to 99)	0	0	0	0	0	6	6
Medium-Large (20+)	5		2	31		0	38
Large (100+)	0	0	0	0	0	3	3
Unknown Size	3	0	1	14	4	15	38
Takoradi	15	7	12	45	13	32	124
Small (5 to 19)	9	7	12	36	12	17	94
Medium (20 to 99)	0	0	0	0	0	4	4
Medium-Large (20+)	3			5		6	14
Large (100+)	0	0	0	0	0	0	0
Unknown Size	3	0	0	3	1	5	12
Tema	41	33	71	54	45	84	328
Small (5 to 19)	33	25	54	41	33	26	211
Medium (20 to 99)	4	3	7	9	8	30	62
Medium-Large (20+)	0	3	8	4	3	10	28
Large (100+)	3	1	2	0	1	6	13
Unknown Size	2	0	0	0	0	12	13
Grand Total	149	137	181	345	227	376	1415

Panel Enterprise Survey

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturing	Retail	Other Services	Grand Total
Accra	2	9	1	13	0	4	28
Small (5 to 19)	2	1	0	6	0	3	11
Medium (20 to 99)	0	0	1	5	0	1	7
Medium-Large (20+)	0	0	0	0	0	0	0
Large (100+)	0	8	0	2	0	0	10
Unknown Size	0	0	0	0	0	0	0
North	0	0	0	5	4	2	11
Small (5 to 19)	0	0	0	5	3	1	9
Medium (20 to 99)	0	0	0	0	1	1	2
Medium-Large (20+)	0		0	0		0	0
Large (100+)	0	0	0	0	0	0	0
Unknown Size	0	0	0	0	0	0	0
Takoradi	0	0	0	3	1	1	6
Small (5 to 19)	0	0	0	2	1	1	4
Medium (20 to 99)	0	0	0	1	0	0	1
Medium-Large (20+)	0			0		0	0
Large (100+)	0	0	0	0	0	0	0
Unknown Size	0	0	0	0	0	0	0
Tema	0	0	0	1	0	0	1
Small (5 to 19)	0	0	0	0	0	0	0
Medium (20 to 99)	0	0	0	1	0	0	1
Medium-Large (20+)	0	0	0	0	0	0	0
Large (100+)	0	0	0	0	0	0	0
Unknown Size	0	0	0	0	0	0	0
Grand Total	2	9	1	22	5	7	46

Weak Universe Estimates

Fresh Enterprise Survey

		Other						
	Food	Chemicals & Plastic	Metals & Machinery	Manufacturing	Retail	Other Services	Grand Total	
Accra	231	251	176	523	431	730	2342	
Small (5 to 19)	176	216	162	306	320	310	1490	
Medium (20 to 99)	1	1	2	31	16	20	71	
Medium-Large (20+)	14	24	12	20	17	65	152	
Large (100+)	0	0	0	24	3	7	34	
Unknown Size	40	10	0	140	76	328	594	
North	94	68	79	283	94	172	790	
Small (5 to 19)	64	68	73	139	73	80	496	
Medium (20 to 99)	0	0	0	0	0	7	7	
Medium-Large (20+)	10		2	64		0	76	
Large (100+)	0	0	0	0	0	4	4	
Unknown Size	20	0	4	80	22	82	208	
Takoradi	63	34	44	198	58	114	512	
Small (5 to 19)	40	34	44	161	48	56	384	
Medium (20 to 99)	0	0	0	0	0	7	7	
Medium-Large (20+)	8			15		16	39	
Large (100+)	0	0	0	0	0	0	0	
Unknown Size	15	0	0	22	10	34	81	
Tema	114	89	152	140	104	190	789	
Small (5 to 19)	97	76	129	119	87	71	580	
Medium (20 to 99)	5	5	8	13	10	39	80	
Medium-Large (20+)	0	7	12	7	5	17	48	
Large (100+)	5	2	2	0	2	7	17	
Unknown Size	8	0	0	0	0	56	64	
Grand Total	502	443	451	1143	687	1206	4432	

Panel Enterprise Survey

				Other			
	Food	Chemicals & Plastic	Metals & Machinery	Manufacturing	Retail	Other Services	Grand Total
Accra	24	9	4	100	0	55	191
Small (5 to 19)	24	2	0	71	0	49	146
Medium (20 to 99)	0	0	4	23	0	5	32
Medium-Large (20+)	0	0	0	0	0	0	0
Large (100+)	0	7	0	6	0	0	13
Unknown Size	0	0	0	0	0	0	0
North	0	0	0	44	34	31	109
Small (5 to 19)	0	0	0	44	33	26	103
Medium (20 to 99)	0	0	0	0	1	5	6
Medium-Large (20+)	0		0	0		0	0
Large (100+)	0	0	0	0	0	0	0
Unknown Size	0	0	0	0	0	0	0
Takoradi	0	0	0	16	9	12	37
Small (5 to 19)	0	0	0	13	9	12	34
Medium (20 to 99)	0	0	0	3	0	0	3
Medium-Large (20+)	0			0		0	0
Large (100+)	0	0	0	0	0	0	0
Unknown Size	0	0	0	0	0	0	0
Tema	0	0	0	1	0	0	1
Small (5 to 19)	0	0	0	0	0	0	0
Medium (20 to 99)	0	0	0	1	0	0	1
Medium-Large (20+)	0	0	0	0	0	0	0
Large (100+)	0	0	0	0	0	0	0
Unknown Size	0	0	0	0	0	0	0
Grand Total	24	9	4	162	43	98	339

Appendix E

Original Sample Design, Ghana:

Region name	Sampling Employee size	Other					Retail	Other Services	Grand Total
		Food	Chemicals & Plastic	Metals & Machinery	Manufacturing				
Accra	Small (5-19)	18	15	14	25	26	25	123	
	Medium&Large (20+)	18	26	13	25	40	39	161	
Total Accra		36	41	27	50	66	64	284	
North	Small (5-19)	18	17	18	25	10	5	93	
	Medium&Large (20+)	11	1	2	30	8	4	56	
Total North		29	18	20	55	18	9	149	
Takoradi	Small (5-19)	18	17	19	15	10	7	86	
	Medium&Large (20+)	10	1	0	18	8	17	54	
Total Takoradi		28	18	19	33	18	24	140	
Tema	Small (5-19)	19	19	19	13	10	5	85	
	Medium&Large (20+)	8	7	13	8	8	18	62	
Total Tema		27	26	32	21	18	23	147	
Grand Total		120	103	98	159	120	120	720	

Completed Interviews, Ghana:

	Food	Chemicals & Plastic	Metals & Machinery	Other Manufacturi ng	Retail	Other Services	Grand Total
Accra	24	10	34	118	70	99	355
Small (5-19)	18	2	29	70	56	55	230
Meduim (20-99)	4	5	4	32	12	31	88
Large (100+)	2	3	1	16	2	13	37
North	13	6	16	52	21	39	147
Small (5-19)	6	3	13	37	16	33	108
Meduim (20-99)	7	3	3	11	5	6	35
Large (100+)				4			4
Takoradi	3	1	3	15	9	28	59
Small (5-19)	2		3	11	8	17	41
Meduim (20-99)				4	1	11	16
Large (100+)	1	1					2
Tema	17	9	27	29	14	63	159
Small (5-19)	12	6	19	22	10	24	93
Meduim (20-99)	3	2	5	5	4	31	50
Large (100+)	2	1	3	2		8	16
Grand Total	57	26	80	214	114	229	720

Appendix F

Local Agency team involved in the study:

Local Agency	Name: TNS RMS Ghana Country: Ghana Activities since: 1972
Enumerators involved:	Enumerators: 50 Recruiters: 10
Other staff involved:	Fieldwork Coordinators: 8 Data Entry: 3 Data Processing: 1

Sample Frame:

Characteristic of sample frame used:	<p>Panel: List from the 2007 Ghana Enterprise Survey</p> <p>Fresh:</p> <ul style="list-style-type: none"> - Ghana Statistical Service Firm Registry; - Ghana Statistical Service VAT firms; - Ghana Statistical Service Large Tax Payers; <p>About 70% of the information provided in the sampling lists from the Ghana Statistical Service and Ghana Chamber of Commerce and Industry sample frame were not accurate (e.g. wrong phone numbers, inaccurate company size, defunct firms etc.)</p>
Source:	Ghana Statistical Service (GSS);
Year:	2012
Additional list	<ul style="list-style-type: none"> - List from Ghana Chamber of Commerce and Industry; - List from Business Associations; - List from Block enumeration, <p>Additional lists are from 2012-2014</p>

Sectors included in the Sample:

Original Sectors	<p>The manufacturing sector comprises all manufacturing establishments as mentioned in group D</p> <p>The service sector includes Group F (construction), Groups G, Group H (hotels and restaurants), Group I (transport, storage, and communications) and subsector 72 from Group K</p>
Added (top up) Sectors	None

Fieldwork and country situation:

Date of Fieldwork	December 2012 – July 2014
Country	Ghana
Use of CAPI	<ul style="list-style-type: none"> • NO
Problems found during fieldwork:	<ul style="list-style-type: none"> ▪ The main issues during fieldwork came from the sample frame: the initial list provided for the study was outdated and largely unsatisfactory, a substantive number of firms could not be found. ▪ Some of the firms have changed locations or changed their address – this made it very difficult to trace them. ▪ Companies with landline numbers were difficult to contact, as most of the numbers have changed and in some cases, this made it impossible to contact these firms. ▪ The questionnaire was lengthy and also was probing too many sensitive questions (finance - revenue/expenditure) that firms in Ghana are hesitant to provide. This concerns especially the section K and N of the questionnaire. ▪ Some of the respondents found it difficult to go through their record books to answer and a good proportion of the interviewed firms (slightly above 70% of the sample) did not have – or did not want to get- books.
Country specific situation	<ul style="list-style-type: none"> ▪ The numerous taxes imposed on firms makes some respondents hesitant to provide accurate financial indicators with the view that such information may be leaked to the governmental authorities which are in charge of taxes. ▪ There were numerous labor agitations during the time of the fieldwork that made some appointments to be rescheduled continually.