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Where are Iraq's Poor:
Mapping Poverty in Iraq

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Table of Contents

List of Tables

List of Figures

1 Introduction

Measuring poverty and tracking it over time is an important prerequisite to national economic planning. Until recently, reliable information on the standard of living of all Iraqis was not forthcoming. Although household budget surveys were conducted in 1992/93 and 2002, they excluded the Kurdistan region. Absence of official data on household expenditure or poverty line hampered the ability of Iraqi policymakers to understand the extent of the problem, analyze their causes, and devise appropriate policies.

Iraq Household Socioeconomic Survey 2006/07 (IHSES) was the first survey of its kind since 1988 to cover all 18 governorates. The survey collected rich information on income, expenditure, employment, housing, education, health, and other socioeconomic indicators. It was followed by construction of an official poverty line and assessment of causes and consequences of poverty. IHSES 2006/07 also formed the basis for Iraq's National Strategy for Poverty Reduction 2009.

Building on the experience of the first IHSES survey and using international best practice on sampling and questionnaire design and survey implementation, the second round of IHSES was fielded in 2012/13. A nationally representative sample of more than 25,000 households from all 18 governorates was interviewed on multiple topics. A comprehensive assessment of household welfare and its determinants was completed in 2014 culminating in the report *The Unfulfilled Promise of Oil and Growth: Poverty, Inclusion, and Welfare in Iraq* (The World Bank, 2014).

Although national, regional, governorate, and qhada (district) level poverty rates can be estimated from the IHSES 2012/13 data, sampling design and sample size of the survey does not allow reliable and representative poverty estimates at the nahiya (sub-district) level. To fill this data gap, a larger survey was designed to collect information on correlates of household welfare like demographic characteristics, education, occupation, housing, and assets and estimate small-area poverty rates using projection methods. This report presents results from the exercise, the first of its kind for Iraq. Poverty mapping not only provides a visual representation of poverty at subnational levels, it also reveals pockets of poverty and islands of prosperity where they exist. This knowledge is useful to inform decisions on policy design and targeting of development projects and programs.

2 Poverty Mapping Methodology

Survey-to-census imputation

Conventionally, the discussion and motivation for small area estimation is framed around imputation from survey to census. It combines the strengths of household budget survey and census to estimate poverty headcount and other indicators at small geographical areas. Budget surveys collect detailed information on household expenditure which yields average income, poverty headcount rate, and other welfare and inequality measures. The surveys usually allow subnational estimates at the first administrative level such as regions, provinces, or urban and rural areas. However, the sample size of the surveys is usually too small to make reliable statements at lower administrative units like districts, sub-districts, or census tracts. On the other hand, all households are interviewed in a census which mitigates the small sample problem. The downside is that information on income or expenditure is typically not collected in the census. Small area estimation involves modeling a relationship between expenditure and individual, household, and location characteristics in the survey and imposing the relationship on the census to estimate household expenditure. Of course, for this exercise to be possible, the variables used for modeling household expenditure must be common to the survey and the census.

We follow the small area estimation methodology developed by Elbers, Lanjouw and Lanjouw (2002) (2003) (henceforth ELL). The exercise proceeds in three steps. First, the variables common to survey and census are identified. These usually include demographic characteristics like age, gender, marital status, ethnicity, education, and occupation, dwelling characteristics like ownership and occupancy of dwelling, type of wall, roof, floor, kitchen, toilet, sewage, garbage disposal, lighting, cooking fuel, heating, and drinking water, and ownership of assets like livestock and poultry, agricultural land, agricultural equipments, electronic equipments, furniture, and vehicles.

Identifying the common set of variables is only the first step; they also have to be vetted for statistical comparability. For a variable to be used in modeling, the means of the variable, if not the distributions, must be statistically indistinguishable. Many variables have means that are statistically different from each other which makes them ineligible to be included in the model.

In the second step, household expenditure is regressed on the set of candidate variables as following:

$$ln(y_{ic}) = X_{ic}\beta + Z_c\gamma + u_{ic} \quad (1)$$

where $\ln(y_{ic})$ is the log of per capita expenditure of household i in cluster c, X_{ic} is the vector of household and cluster characteristics respectively, and u_{ic} is the vector of disturbances with distribution $F(0,\Sigma)$. Efficient estimates of the betas are obtained by estimating the variance-covariance matrix of the error term ($\hat{\Sigma}$)and using generalized least squares (GLS) to estimate the parameters. One of the concerns in running regression (1) is whether or not household level variables can sufficiently capture the intra-cluster correlation of welfare, i.e, the correlation in household welfare due to cluster-specific characteristics. It is recommended that cluster level information be added to the regression, either from auxiliary data sources or by creating area-level average from the larger survey and merging it with the survey.

It is assumed that the error term consists of a location-specific component and a household-specific component that are independent of each other and uncorrelated to the observable characteristics:

$$u_{ic} = \eta_c + \varepsilon_{ic} \quad (2)$$

This specification allows for correlation in household expenditure within clusters and heteroskedasticity in the household component of the error term.[1]

To estimate the variance-covariance matrix $\hat{\Sigma}$, equation (1) is first estimated using Ordinary Least Squares (OLS) to obtain the residuals $\hat{u}_{ic}$. The location component is estimated as the mean of residuals within a cluster and the household component is estimated as the overall residual minus the location component as shown in equations (3) and (4):

$$\hat{\eta}_c = \frac{1}{n_c}\sum_{i=1}^{n_c}\hat{u}_{ic} \quad (3)$$

$$\hat{\varepsilon}_{ic} = (\hat{u}_{ic} - \hat{\eta}_c) \quad (4)$$

Heteroskedasticity in the household error component $\hat{\sigma}^2_{\varepsilon,ic}$ is modeled using a flexible logistic function and variance of the cluster effect $\hat{\sigma}^2_{\eta,c}$ is estimated nonparametrically allowing for heteroskedasticity in ε_{ic}. Having estimated $\hat{\sigma}^2_{\eta,c}$ and $\hat{\sigma}^2_{\varepsilon,ic}$ and thus $\hat{\Sigma}$, efficient estimates of the betas ($\hat{\beta}_{GLS}$) in equation (1) and their variance-covariance matrix $\hat{V}(\hat{\beta}_{GLS})$ are obtained from the GLS procedure.

In the third step, household welfare in the larger survey is estimated by drawing a vector of betas ($\tilde{\beta}$) from the multivariate normal distribution with mean $\tilde{\beta}$ and variance-covariance matrix $\hat{V}(\hat{\beta}_{GLS})$, a vector of location disturbance component $\tilde{\eta}_c$ from a distribution with mean 0 and variance $\hat{\sigma}^2_{\eta,c}$ and a vector of household error component $\tilde{\varepsilon}_{ic}$ from a normal distribution with mean 0 and variance $\hat{\sigma}^2_{\varepsilon,ic}$. Finally, these components are used to estimate the household expenditure for each household:

$$\ln(\tilde{y}_{ic}) = X_{ic}\tilde{\beta} + \tilde{\eta}_c + \tilde{\varepsilon}_{ic} \quad (5)$$

This procedure is repeated multiple times, often 100 or more, with the headcount rate and other welfare measures calculated for each round of simulation. The average over all the rounds of simulation is then reported as the point estimate and the standard error of the estimate is derived from the standard deviation of the measures. A key underlying assumption is that of stability of beta parameters, i.e., the estimated relationship

[1] The location-specific error component is assumed to be homoskedastic because the number of clusters in the household surveys is often too small to allow for heteroskedasticity.

between expenditure and household and individual characteristics do not change between the survey and the census.

There are three sources of error in the predicted welfare estimates. Idiosyncratic error is the error due to the difference in realized and expected consumption. Model error arises because of the possible bias in the estimated betas due to model misspecification. And computational error is the error inherent in obtaining the results through simulation. The smaller the area of interest, or the fewer the number of households per area, the larger is the idiosyncratic error. Thus idiosyncratic error can be reduced by imputing at higher level of aggregation. The only constraint to computation error is computational power as it declined with the number of simulations. Modeling error can be minimized by careful selection of variables, regression specifications, and the subgroups for which the model is estimated.

In a recent critique of the ELL methodology, Tarozzi and Deaton (2009) argue that it understates the standard error, and thus overstates the precision of the estimates, if there is correlation across clusters in an area. However, this is an empirical question and it is not necessarily true in every situation. Indeed, Elbers, Lanjouw, and Leite (2009) demonstrate using data from Brazil that the degree of understatement is minimal. The effect of correlation within and across clusters can be minimized by introducing area level means into the consumption model to capture cluster level heterogeneity.

Newer developments in the small area estimation literature extend the ELL method to obtain more efficient and consistent estimators. Molina and Rao (2010) propose empirical best (EB) method which improves the efficiency of point estimates by utilizing the available information on households in domains that are in both the survey and the census and Elbers and van der Weide (2014) add a nested error structure to the EB model to obtain a more consistent estimator than ELL.

Survey-to-survey imputation

Iraq presents a unique challenge because recent census data is not available for the country. The last Iraqi census was in 1997 which excluded the three Kurdish governorates of Duhok, Sulaimaniya, and Erbil. Instead, imputation is done on a larger household survey designed explicitly to allow for small area estimation. We apply recent adaptation of the ELL methodology to predict poverty rate from one survey to another. The core methodology remains the same—build a consumption model using household expenditure survey and use it to predict consumption in other surveys. This is often used to predict poverty rate over time. Household expenditure surveys are conducted infrequently, usually every three to five years. The absence of data makes it difficult to estimate welfare trend in the intervening years. Nevertheless, if information on correlates of poverty is available for those years, poverty headcount and other welfare indicators can be estimated using the projection method. The assumption of stability of beta parameters becomes even more important for survey-to-survey imputation because the projection is often several years forward.

In addition to the conventional sources of error, a fourth source of error—sampling error—pertains to survey-to-survey exercise because imputation is done on survey data rather than census. Sampling error is assumed to be independent of other errors. Thus standard errors are larger than what they would be had census data been used. Sampling error in the prediction data was accounted for by exporting the simulated data to Stata and obtaining robust standard errors after "survey setting" the data, i.e., specifying household weight and strata and cluster variables.

3 Data

Imputation data for poverty mapping exercise comes from Iraq Poverty Mapping and Maternal Mortality Survey (I-PMM), a nationally representative survey of more than 300,000 households, conducted close on the heels of IHSES 2012/13. The objectives of I-PMM were twofold: to estimate maternal mortality rate and collect reliable information on socioeconomic indicators from a large number of households.

The I-PMM data has many advantages over a regular census data because it was designed explicitly to allow for small area estimation. The I-PMM questionnaire included the expected candidate variables for modeling and imputation. Detailed information on the size, composition, and structure of the households came from the household roster and the survey asked about other usual strong predictors of welfare like education and occupation of household members, characteristics of dwelling, and ownership of assets. In addition, distance from and time taken to the nearest facilities captured location-level differences which improved the prediction power of the regression models. Literature shows that the alteration of the wording of the question, response options, and ordering of the questions may affect survey responses and often it is not possible to anticipate the direction and size of such bias. Thus the questions in the I-PMM survey were adapted from IHSES with little modification. Oftentimes, there is a lag of many years between survey and census which strains the assumption of the stability of beta parameters. This was not an issue in Iraq because I-PMM was conducted immediately after IHSES 2012/13. Finally, to the extent that differences in survey implementation cause differences in data, this is less of a concern because both the surveys were conducted by the same team of Central Statistics Office (CSO) and Kurdistan Rregion Statistics Office (KRSO) staff and the two surveys were closely coordinated.

Information on household expenditure for poverty mapping comes from Iraq Household and Socioeconomic Survey (IHSES) 2012/13, a nationally representative income and expenditure survey in Iraq. Modeled after the Living Standard Measurement Surveys (LSMS), it collects detailed data on household income and expenditure, health and education, employment and job search, displacement, housing and access to services, and many other socioeconomic indicators from more 25,000 households.

Besides IHSES and I-PMM, two auxiliary data sources were explored to augment to the regression model: Multiple Indicator Cluster Survey (MICS) 2011 and Iraq Civil War Dataset from the Empirical Survey of Conflict (ESOC) study. MICS 2011 is a nationally representative household survey focusing on indicators of women's and children's wellbeing like marriage and birth history, child mortality, maternal and newborn health, contraception, HIV/AIDS, breastfeeding, early childhood development, immunization, care of illness among other indicators. Despite having a rich set of information, the MICS 2011 data could not be used due to its sample size. The survey interviewed a total of 36,580 households, implying that the sample size at qhada and nahiya levels were too small for calculation of area-level averages. The Iraq Civil War Dataset contains rich information on violent incidents between coalition forces and insurgents, civilian casualties, spending on reconstruction projects, oil and gas reserves, and election returns. However, the data could not be used in modeling because it does not identify new districts that have been defined since 2003.

In absence of auxiliary data, area-level average were calculated from I-PMM and merged with the IHSES data before including them in the regression model. Area-level means improve the precision of the predictions by capturing the differences in household standard of living due to location characteristics.

4

Candidate Variables

The pool of variables common to the two surveys is as following:

Demographic characteristics: Gender, age, birthplace, marital status, household size, number of children, adults, and elderly in the household, dependency ratio

Education: Education level of the household head, highest level of education by any household member

Occupation: Employment status, occupation, sector of employment

Housing characteristics: Type of housing unit, main construction material of wall, total area of land and dwelling, ownership and occupancy status of dwelling, source of drinking water and electricity, type of sewage and toilet

Productive and durable assets: Ownership of cooler, refrigerator, freezer, electrical generator, cooker, television, washing machine, dishwasher, water heater, heater, electric fan, air conditioner, vacuum cleaner, motorcycle, car, and PC

Location: Distance from and time taken to the nearest school, hospital, health center, bank, bus stop, market, paved road, etc.

5 Modeling

The level at which regression models are run must be chosen judiciously. If a single model is specified for the entire country, the implicit assumption is that the parameter estimates on the regressors are the same for all regions of the country. In other words, a national model assumes that the relationship between household expenditure and household characteristics are uniform throughout the country. This may not be a tenable assumption in a country like Iraq with wide spatial heterogeneity in incidence of violence, endowment of natural resources, and robustness of factor markets. For example, returns to education are likely higher in Baghdad where formal job market is more robust than in the poorest governorates with thin labor markets. Fitting separate models by region allows the relationship between expenditure and the explanatory variables to vary and it reduces the standard error of poverty prediction due to the error in modeling. An alternative way to allow the coefficients to vary by region is to interact the variables with regional dummy variables in the regression. This approach is flexible enough to allow differential relationships across regions and also minimizes the chances of overfitting.

In this exercise, we proceeded in a top-down fashion to decide the level at which to model the relationship, starting from a national-level regression. The national model yielded accurate prediction for the whole of Iraq but the model could not capture the heterogeneity across governorates reflected by poor governorate level predictions compared to direct estimates from IHSES. In the next iteration, three regional models were fitted, one each for Baghdad, Kurdistan (Duhok, Sulaimaniya, and Erbil) and Rest of Iraq (14 governorates). Accurate predictions were obtained for Baghdad and the three Kurdistan governorates but the third model was still not flexible enough to capture the differences across 14 governorates. Next, five division-level models were run for Baghdad, Kurdistan, North (Nainawa, Kirkuk, and Salah ad-Din), Centre (Anbar, Diyala, Najaf, Kerbela, Wasit, and Babylon) and South (Qadisiya, Thi-Qar, Muthana, Maysan, and Basrah). The governorate level predictions from the division level regressions were not satisfactorily close to the IHSES estimates in the North, Centre, and South.

Finally, one model for each governorate was run. One concern with running multiple models is the loss in degrees of freedom and the risk of overfitting, i.e., the models are forced to explain the

noise in the data in small sample. To avoid the problem of overfitting, researchers recommended that the sample size be no smaller than 300 for each regression (Ahmed, Dorji, Takamatsu, & Yoshida, 2014). By this criterion, governorate level regressions were feasible because the governorate with the smallest sample size was Kerbela with 612 households. An important implication of running governorate-level regressions is that the variables must be comparable at the level of the governorates; a variable that is statistically indistinguishable at the national level may nevertheless be different for a particular governorate. Thus only those variables whose averages are statistically similar within governorates are used in each model.

Appendix B presents the results for each GLS model. The variables that consistently feature as significant predictors of household expenditure are education level and sector of employment of the household head, household size, age composition of the household, and ownership of durable goods like washing machine, water heater, and vacuum cleaner. This is consistent with general intuition about correlates of welfare and it jibes with the findings of the poverty assessment report as well. Nevertheless, one should be cautious in interpreting the regression coefficients as causal estimates. Unlike general regression analysis, the purpose of these regression models are not to explain the causes of household welfare and obtain parameter estimates on explanatory variables. The models are simply derived for accurate prediction of per capita expenditure. It is entirely possible that some important variables for causal analysis are missing from the regression either because they are not available in both the datasets or they are statistically not similar. In such situations, the parameter estimates will be biased if there is a correlation between included and omitted variables. It is even possible for a variable to be significant in the opposite direction than what one would expect by intuition or theory.

6

Poverty Lines

The poverty line in Iraq is derived from the cost of basic need approach. It is defined as the level of food expenditure necessary for minimum caloric intake and non-food expenditure necessary to maintain a minimum acceptable standard of living. The official poverty line is defined nationally according to the patterns and distribution in non-food consumption in the national sample. Although it uses a single bundle of goods, it adjusts for spatial prices differences. To account for differences in tastes and habits in consumption, regional poverty lines for Kurdistan, Baghdad, and Rest of Iraq were also constructed at the request of the Iraqi government. Unlike the national poverty line, regional lines are derived based on consumption patterns within the region. The national and regional poverty lines are shown in Table 1.

To be consistent with the official poverty estimates which are calculated using the unique national poverty line, national poverty line is used for simulation in this exercise. A larger point is that for the purpose of poverty mapping, the choice of poverty line is not crucial. The goal of poverty map is to reveal the spatial heterogeneity in standard of living. As such, relative ranking of areas rather than absolute values is more important. The choice of the poverty line has little bearing on the ranking of areas within governorates. Indeed, correlation of within-governorate rank of nahiyas calculated using regional and national poverty lines is 0.87.

TABLE 1: Poverty lines (ID per person per month)

Regional poverty lines	
Kurdistan	142410.7
Baghdad	115934.7
Rest of Iraq	101675.9
National poverty line	105500.4

7

Administrative Structure

There are three levels of administration in Iraq: governorates, qhadas, and nahiyas. The governorates of Duhok, Sulaimaniya, and Erbil form the autonomous region of Kurdistan and the governorate of Baghdad consists of the capital city and the outlying areas. The remaining 14 governorates constitute the rest of Iraq. Each governorate is subdivided into qhadas (districts) and nahiyas (sub-districts). The total number of qhadas and nahiyas are 120 and 393 respectively but their numbers per governorate vary widely (Figure 1).

For the purpose of planning and policymaking, it would be ideal to be able to rank all communities, villages, and towns. However, there is a trade-off between the level at which one estimates poverty and the precision of the estimates; the lower the administrative unit, or the smaller the area, the less precise the poverty estimates become. Number of households per village or town in I-PMM is too low for meaningful poverty projections. Therefore, in this exercise, the lowest administrative level at which poverty rates are reported is the nahiya. This is already a stretch because some nahiyas have as few as 50 households.

FIGURE 1: Administrative structure

Iraq

Governorate	Qhada	Nahiya
Duhok	7	26
Nainawa	10	31
Sulaimaniya	16	61
Kirkuk	4	16
Erbil	9	41
Diyala	6	21
Anbar	8	22
Baghdad	10	32
Babylon	4	16
Kerbela	3	7
Wasit	6	17
Salah Al-Deen	8	17
Najaf	3	10
Qadisiya	4	15
Muthana	4	11
Thi-Qar	5	20
Maysan	6	15
Basrah	7	15
Total	120	393

8

Results

Governorate level predictions

The accuracy of the models is judged by comparing the governorate level predictions with direct estimates from IHSES 2012/13. This comparison is possible because IHSES 2012/13 is representative at the governorate level. Direct and estimated poverty rates, standard errors, and z-values for the difference in means are presented in Table 2.[2] The projections are consistent with the IHSES poverty rates: the estimates for all 18 governorates fall within the 95 percent confidence interval of the IHSES mean and the largest absolute value of z-score is 1.48, well within the usual threshold of two standard errors.

Robustness checks

According to the IHSES, national poverty rate in 2012/13 was 18.9 percent, with the lower and upper bounds of the 95 percent confidence interval 17.9 and 19.9 percent respectively (Table 2), while the weighted average of predicted poverty rates is 18.2 percent. Thus the estimate falls well within 2 standard deviation of the IHSES rate and the absolute difference is only 0.7 percent.

With 18 governorates, there are 153 pairs of between-governorate comparisons of statistical significance. In IHSES, 119 pairs of governorates have statistically different poverty rates. The imputation results are remarkably consistent with the IHSES results: of the 119 pairs, 116 are statistically different in the imputation data as well. In addition, 14 new pairs of governorates are statistically different in the simulation, bringing the total to 130. This also shows that the loss in precision due to modeling and sampling errors is more than offset by the gain due to larger sample size.

[2] z-value measures the distance between the two means in standard errors:
$z = (\mu_{IPMM} - \mu_{IHSES}) / \sqrt{(s.e._{IPMM})^2 + (s.e._{IHSES})^2}$

TABLE 2: Comparison of direct and predicted estimates

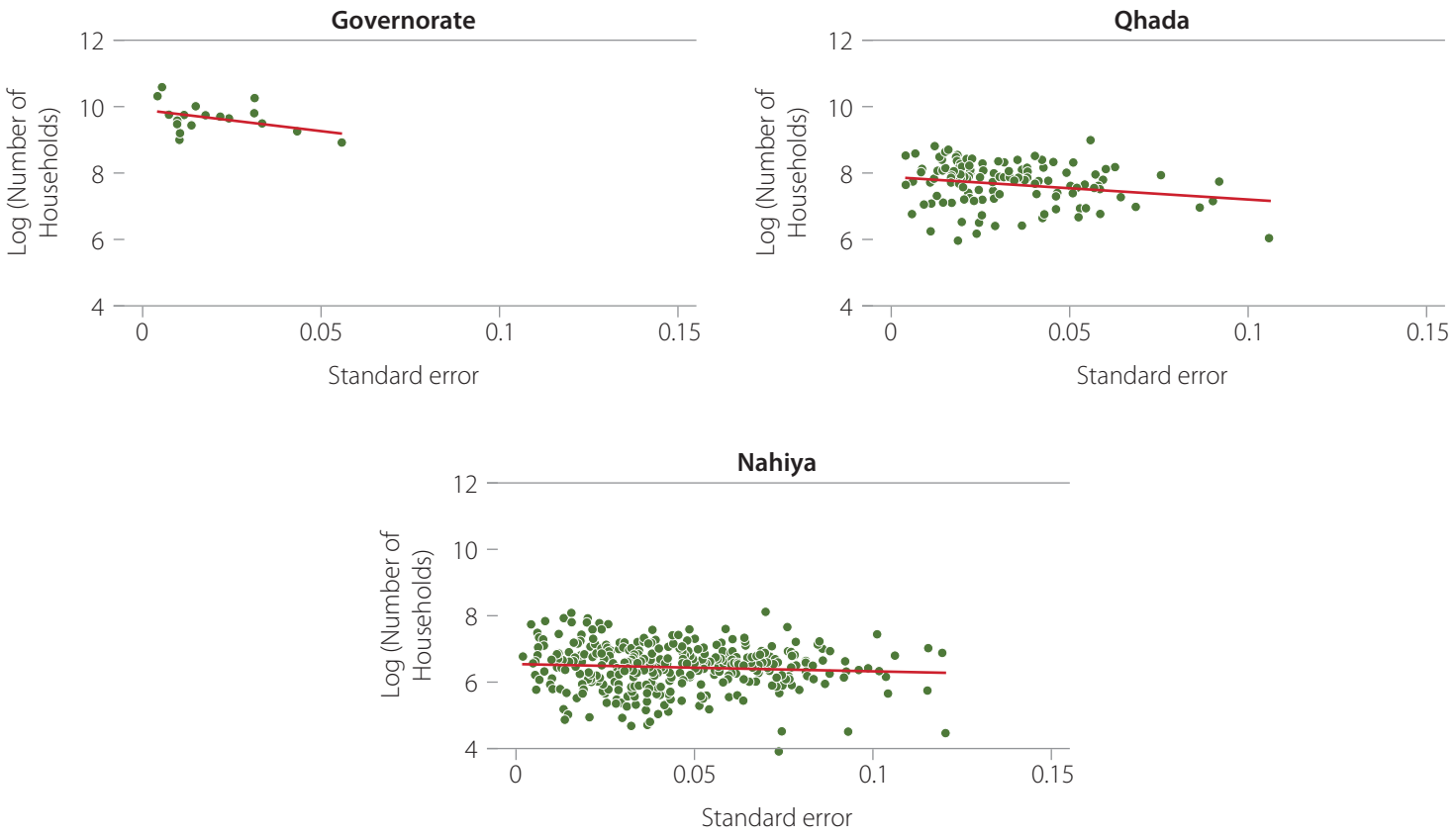
	Sample size		Direct estimate (National poverty line)				PovMap estimate		z-value
	IHSES	I-PMM	FGT(0)	s.e.	95% CI		FGT(0)	s.e.	
Duhok	1,348	14,475	0.058	0.008	0.043	0.073	0.059	0.010	–0.364
Nainawa	1,885	27,814	0.345	0.023	0.301	0.390	0.377	0.031	–0.576
Sulaimaniya	3,292	29,216	0.020	0.003	0.014	0.026	0.014	0.004	0.157
Kirkuk	827	12,586	0.091	0.016	0.059	0.122	0.088	0.010	0.171
Erbil	1,933	22,275	0.036	0.007	0.022	0.049	0.041	0.015	0.870
Diyala	1,272	17,977	0.205	0.018	0.170	0.239	0.208	0.031	0.175
Anbar	1,718	16,055	0.154	0.022	0.111	0.196	0.187	0.022	–1.248
Baghdad	2,150	39,729	0.120	0.012	0.096	0.145	0.108	0.005	1.355
Babylon	863	16,812	0.145	0.016	0.114	0.177	0.122	0.011	1.377
Kerbela	612	8,212	0.124	0.029	0.067	0.180	0.134	0.010	0.214
Wasit	1,291	13,226	0.261	0.029	0.204	0.318	0.247	0.033	0.290
Salah al-deen	1,717	15,283	0.166	0.015	0.137	0.194	0.163	0.024	0.739
Najaf	646	9,866	0.108	0.026	0.057	0.158	0.087	0.010	0.307
Qadisiya	858	12,356	0.441	0.026	0.390	0.492	0.448	0.014	0.162
Muthanna	862	7,456	0.525	0.036	0.455	0.596	0.544	0.056	0.714
Thi-qar	1,078	16,748	0.409	0.026	0.358	0.459	0.376	0.017	1.043
Maysan	1,288	10,376	0.423	0.033	0.357	0.488	0.365	0.043	1.137
Basrah	1,506	17,022	0.149	0.018	0.114	0.184	0.129	0.007	1.479
Iraq	**25,146**	**307,484**	**0.189**	**0.005**	**0.179**	**0.199**	**0.182**		

Analysis of standard errors

As discussed in the methodology section, there is some uncertainty associated with the predictions. This uncertainty is reflected in the standard error of the estimates; the higher the standard error, the lower the precision and the less one can be confident about the predictions. Therefore, the estimates must be read together with their standard errors. A simplistic reading of the predicted poverty rate might lead one to conclude that one area is poorer than the other while the two areas could be statistically indistinguishable.

It is not surprising that standard errors are decreasing with the sample size. On average, standard errors at the governorate, qhada, and nahiya level are 0.020, 0.032, and 0.045 respectively for sample size of approximately 16994, 2549, and 778 households. Standard errors are also decreasing in the number of households within each level of administration; governorates, qhadas, and nahiyas with fewer households have higher standard error in general, illustrated by the negative slope of the line of best fit in Figure 2.The largest governorate-level standard error is 0.056, while the comparable figure for qhadas and nahiyas are 0.106 and 0.120 respectively (Figure 3). Out of 120 qhadas,

FIGURE 2: Standard error of estimated poverty rate

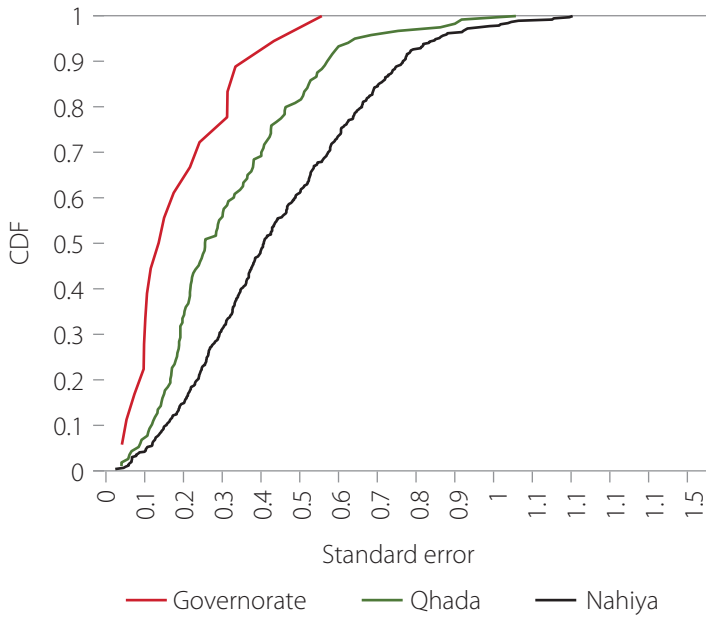


less than a fifth (23) have standard error of more than 0.050 and nine nahiyas out of 393 have standard error of more than 0.10.

An alternative way to interpret standard errors is through confidence interval. Confidence interval is a range of values which is likely to include an unknown population parameter. The interval varies from sample to sample but if from the same population, a certain independent samples are taken repeatedly, a known percentage of the intervals will include the unknown parameter. Almost half the qhadas (58 of 120) and a quarter of the nahiyas (90 of 393) have a confidence interval of 10 percentage points or lower.

Overall, the estimates are remarkable precise considering the relatively small number of households per nahiya and the sampling error in the imputation data. High degree of comparability between IHSES and IPMM data is likely responsible for the precision in the estimates. Details on nahiya level estimates and their standard errors are presented in Appendix A.

FIGURE 3: CDF of standard errors



9 Maps

Iraq

The visual representation of spatial distribution of poverty confirms many of the previous analytical findings and intuitive notions of prevalence of poverty in the country. The added value of the map is the revelation of pockets of poverty and islands of prosperity that would not have been apparent otherwise. For instance, there is considerable heterogeneity in headcount rate even within the poorest governorates. Nahiya-level headcount rate in Maysan ranges from 21 to 72 percent, a spread of 51 percentage points. The poverty rate in Thi-Qar is 37.6 percent, more than twice the national rate; nevertheless, Al-Nasiriya Qadha Center has a poverty rate of 23.1 percent, only slightly above the national average. Although the poverty rate in Baghdad is 10.8 percent, estimated poverty rate of al-Mishahda nahiya in Baghdad is 49.5 percent, almost five times the governorate average, and it is statistically different from all other nahiyas in the governorate. Only through the small area estimation exercise do these patterns become apparent.

Headcount rate and number of poor are alternative ways to visualize the spatial pattern of poverty. Areas with high headcount rate are typically areas that have historically been marginalized and left out of the development process. Where equity consideration and national political preference prioritizes the development of such regions, it is justified to allocate disproportionately higher budget to those areas to increase linkage with markets and build infrastructure networks like roads, electricity grid, and irrigation canals. Such areas are usually remote, rural, and sparsely populated. However, if the national priority is to reduce poverty headcount, it is efficient to focus on where most of the poor live. Usually, despite low headcount rate, urban and semi-urban areas are host to more poor people than the poorest parts because of the population size. This has important policy implications as we discuss in the concluding section.

Often there is little overlap between areas with the highest poverty rate and areas with the most number of poor people (Figures 4 and 5 and Tables 3 and 4). Not surprisingly, nahiyas with the highest poverty rate are in the Southern governorates of Maysan, Muthana, and Qadisiya. The nahiya with the highest headcount rate is Gammas in Qadisiya (77 percent) followed closely by

FIGURE 4: Headcount rate – Iraq

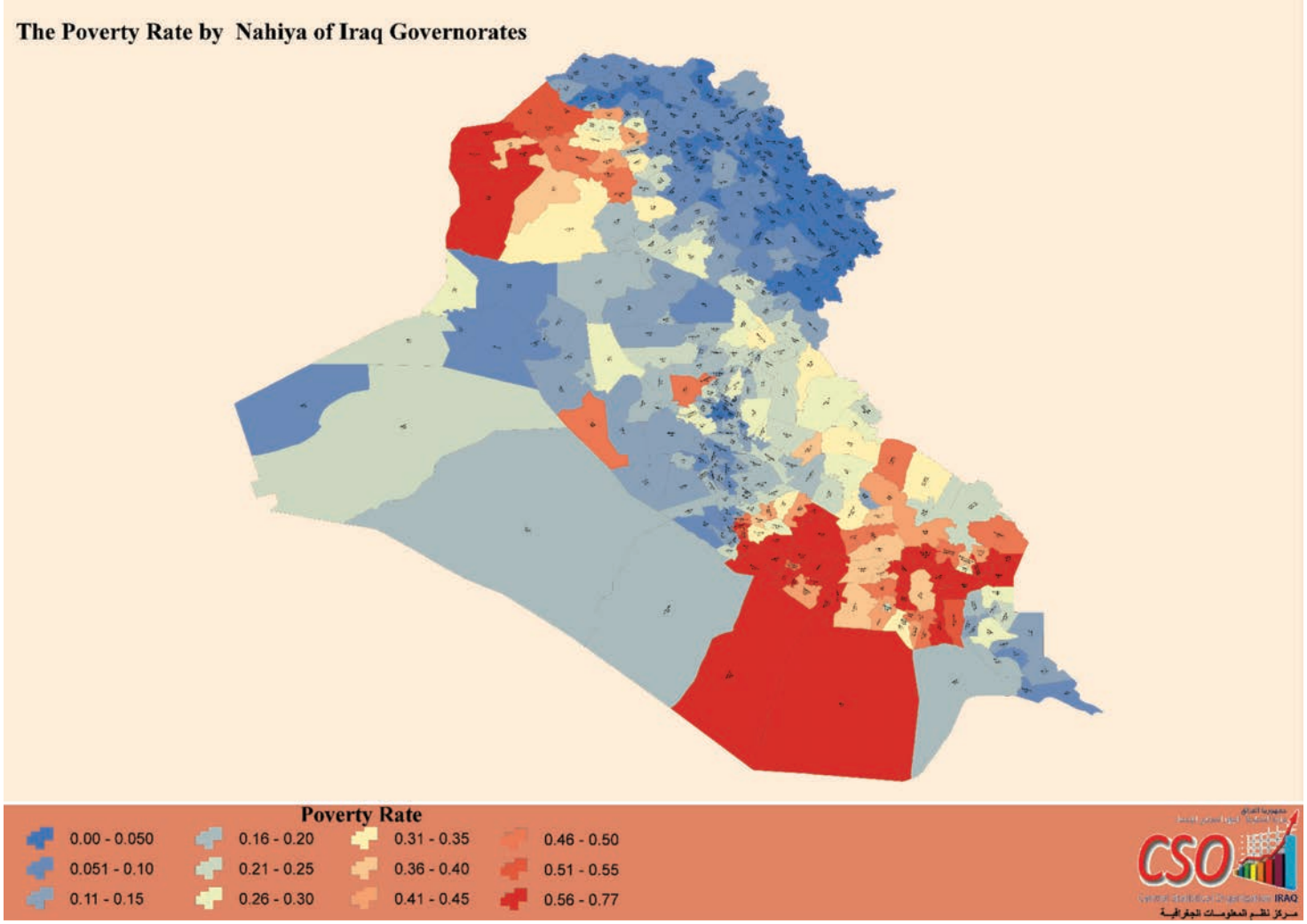


FIGURE 5: Number of poor – Iraq

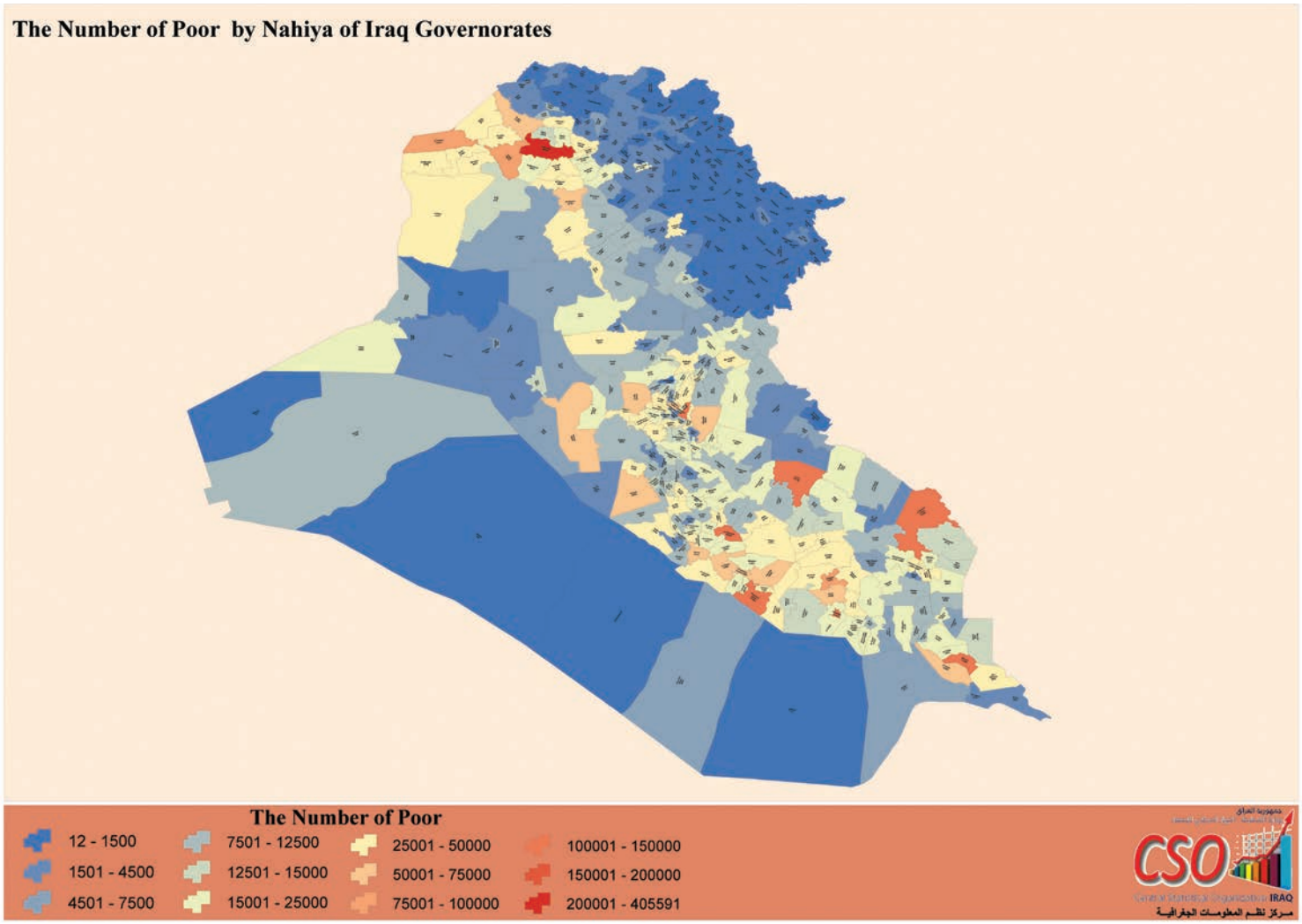


TABLE 3: Ten nahiyas with the highest poverty headcount rates

Governorate	Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Maysan	Said Ahmed Al-Rifaai Nahia	10450	0.67	0.08	0.50	0.82	6968
Maysan	Qalat Saleh Qadha Center	53955	0.68	0.06	0.55	0.77	36808
Maysan	Al-Ezair Nahia	29933	0.70	0.05	0.58	0.79	20875
Muthana	Al-Daraji Nahia	18258	0.70	0.09	0.51	0.86	12740
Muthana	Al-Sowair Nahia	39066	0.70	0.09	0.51	0.87	27428
Muthana	Al-Warka Nahia	93216	0.71	0.09	0.52	0.88	65988
Muthana	Al-Najmi Nahia	32461	0.72	0.08	0.54	0.88	23453
Maysan	Bani Hashim Nahia	20003	0.72	0.06	0.60	0.83	14498
Muthana	Al-Hilal Nahia	31800	0.73	0.08	0.55	0.88	23255
Qadisiya	Gammas Nahia	87526	0.77	0.04	0.68	0.83	67351

Al-Hilal in Muthana (73 percent) and Bani Hashim in Maysan (72 percent). On the other hand, nahiyas with the highest number of poor are urban centers with many residents. The nahiya with the most number of poor people is Al-Mosal Qadha Center where the city of Mosul is located. Although the predicted headcount rate in Mosul is 31 percent, far lower that some other nahiyas in Nainawa, number of poor is high because it has 1.3 million residents. Nahiyas like Baghdad al-Jedeeda and Al-Basrah Qadha Center are further examples of areas that host a large number of poor despite having a low headcount rate. A comparison of Figures 4 and 5 also make this apparent: nahiyas shaded in deep red in the first map have lighter hues in the second and vice versa.

TABLE 4: Ten nahiyas with the most number of poor people

Governorate	Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Nainawa	Al-Shamal Nahia	141128	0.62	0.06	0.49	0.75	87852
Nainawa	Telafar Qadha Center	193602	0.49	0.08	0.32	0.66	95078
Qadisiya	Al-Diwaniya Qadha Center	388415	0.27	0.04	0.20	0.35	105998
Wasit	Al-Kut Qadha Center	407511	0.26	0.06	0.15	0.38	107746
Muthana	Al-Samawa Qadha Center	271285	0.41	0.10	0.19	0.62	111254
Basrah	Al-Basrah Qadha Center	1172742	0.10	0.02	0.06	0.13	111880
Thi-Qar	Al-Nasiriya Qadha Center	498661	0.23	0.04	0.14	0.32	115141
Baghdad	Baghdad Al-Jedeeda Nahia	1140276	0.11	0.02	0.07	0.15	126000
Maysan	Al-Amara Qadha Center	529251	0.25	0.08	0.09	0.41	131625
Nainawa	Al-Mosal Qadha Center	1289229	0.31	0.07	0.17	0.46	405591

Duhouk, Nineveh and Erbil

Duhouk lies in the northwest of Iraq and it is the northern-most governorate, bordering Turkey and Syria and is part of the Kurdistan region. Duhouk was home to many internally displaced persons (IDPs) even before the influx of Syrian refugees in 2014 and the Da'ash related internal displacement.

Overall, poverty rates in Duhouk are low at roughly 6 percent. Estimated poverty headcount rates at the nahiya level range from 3 percent in Zawait, Al-Amadia qadha center, and Sarsank

FIGURE 6: Headcount rate – Duhouk, Nineveh and Erbil

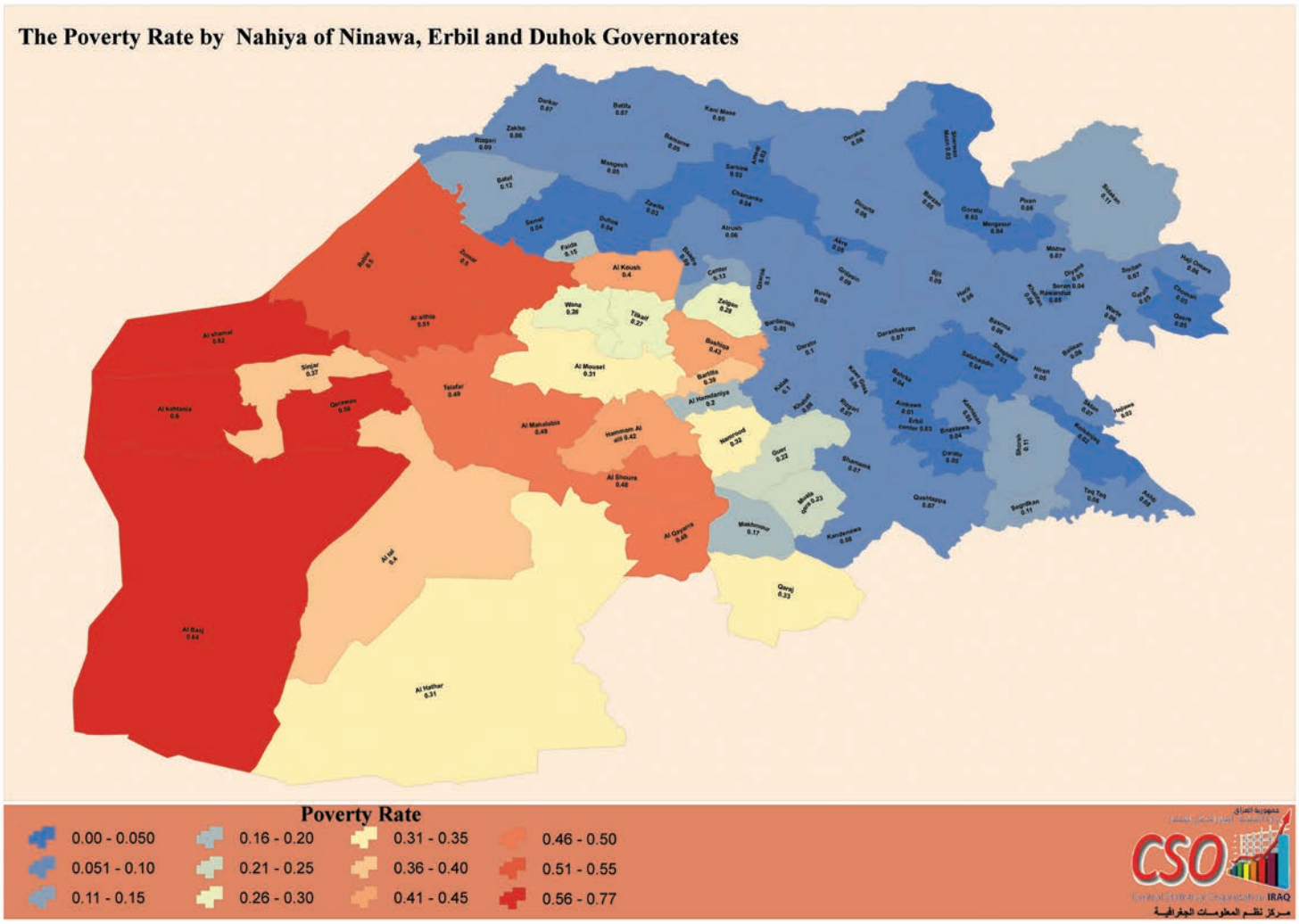
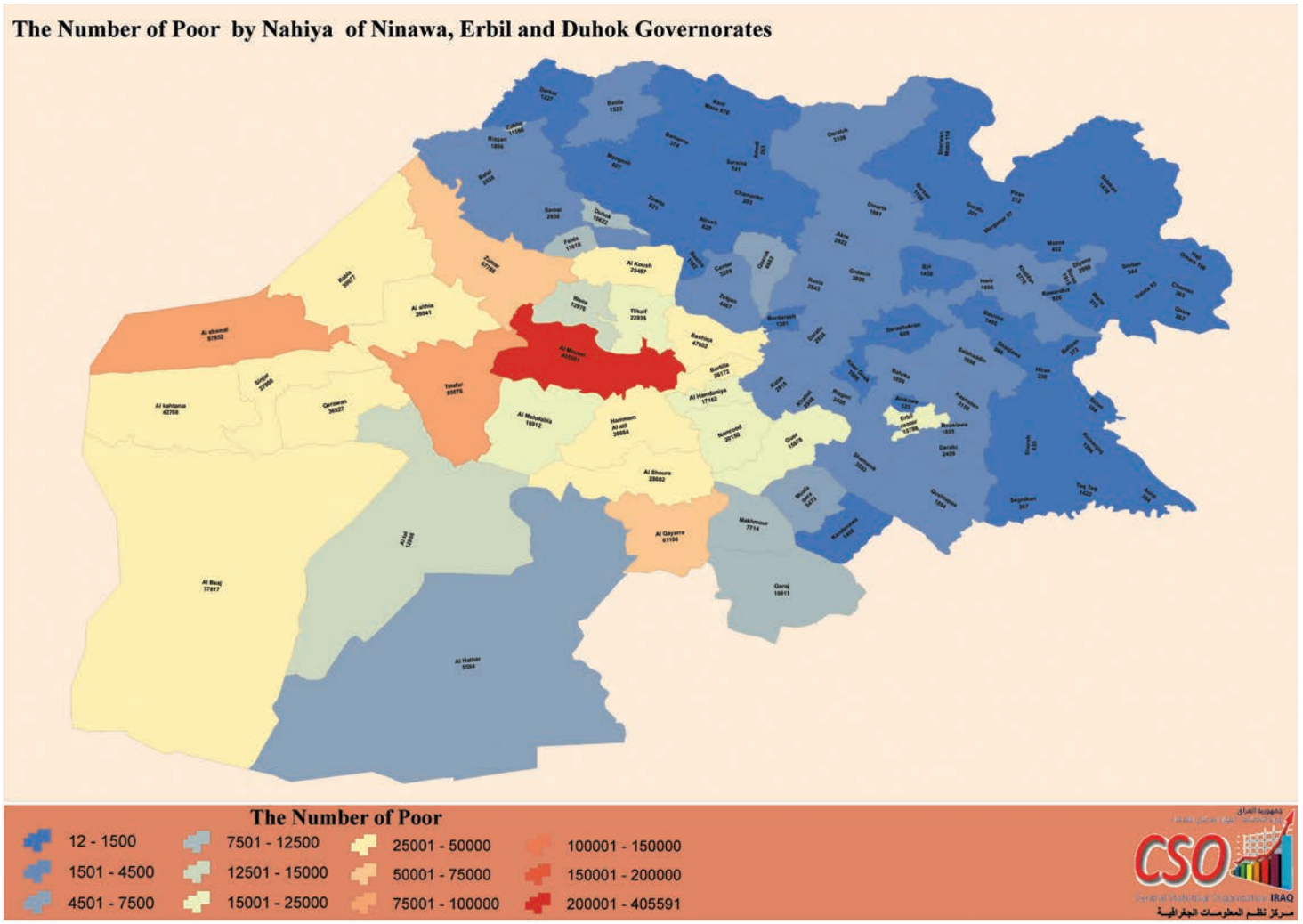


FIGURE 7: Number of poor – Duhouk, Nineveh and Erbil



nahiya to 10 percent or more in Bateel, Qasrouk, Kalak and Darto nahiyas. However, the largest number of poor persons are in two nahiyas—Duhouk qadha center (10,600) and Zakhow qadha center (11,600)[3]. These nahiyas are the largest in terms of population in Duhouk; while the former is the governorate capital, the latter is a major transit and check point with Turkey.

Nineveh or Mosul governorate in northern Iraq shares its western border with Syria. Its capital, Mosul, is one of the largest cities in the country. The governorate continued to experience

[3] The number of poor is rounded to the nearest hundred in the text.

violence between 2007 and 2012, and is one of the five poorest governorates in the country. Nahiya level estimates of poverty reveal a striking variation in headcount rates—from less than 15 percent in Kandinawa, Faidah and Al-Shaikhan qadha center, to 50 percent or more in Zummar, Rabia, Al-Ayadiya, Al-Qairawan, Al-Qahtanya, Al-Baaj, and Al-Shamal nahiyas. All the nahiyas with headcount rate of 50 percent or more either border Syria or lie close to the Syrian border. Many of these are also very populous nahiyas, together accounting for 27 percent of Nineveh's poor, and many of them are home to more than 35,000 poor persons each. However, the largest number of poor people are in Mosul qadha center (406,000 persons), the capital of the governorate, which has a population of 1.28 million. Nineveh has the most disproportionate share of poor in the country—while 10 percent of the Iraqi population resides in the governorate, about 20 percent of the poor lives there.

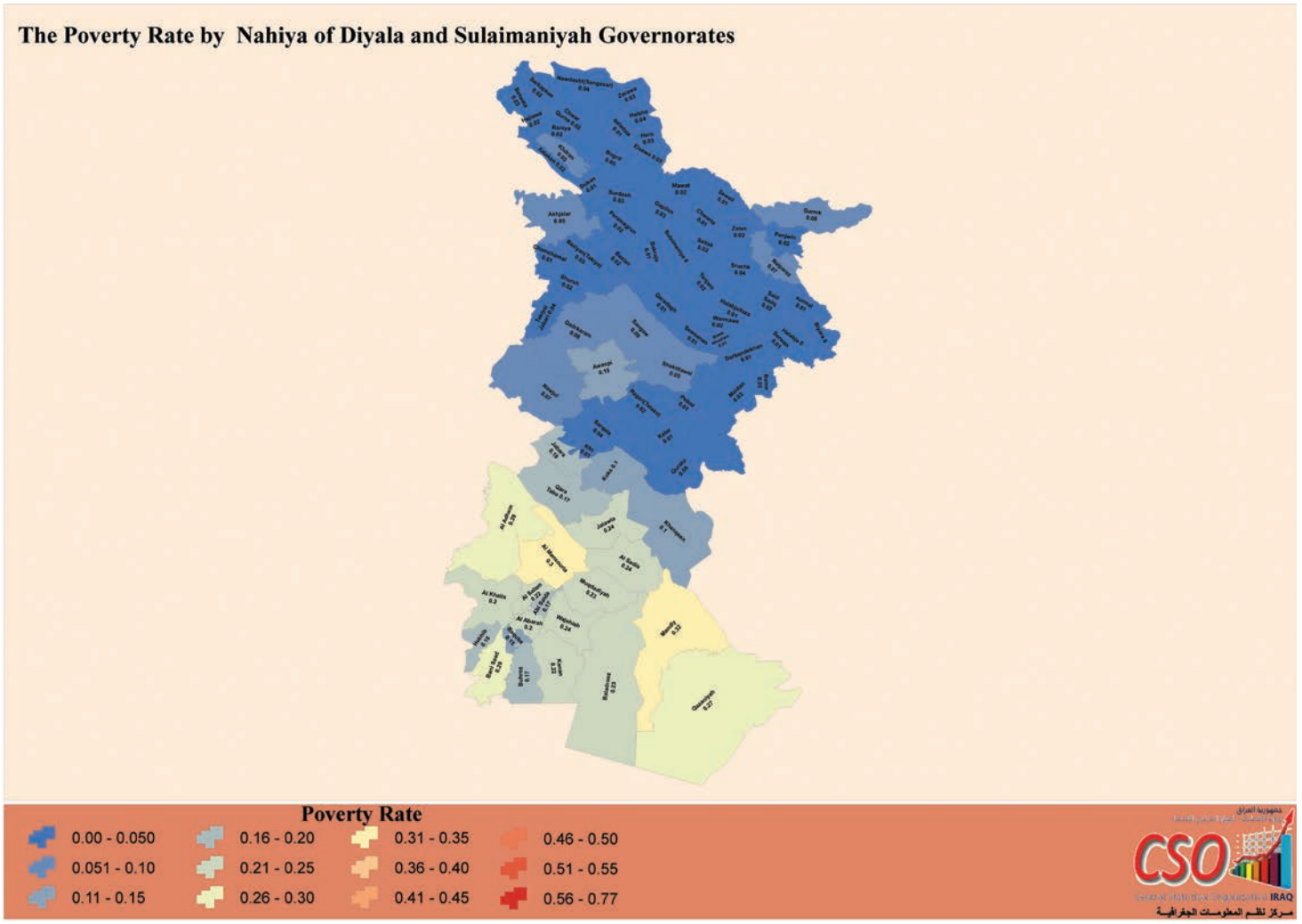
Erbil or Hawler governorate is part of the Kurdistan region of Iraq, and has overall poverty rates of 4.1 percent. At the nahiya level, estimated poverty is almost negligible in Ainkawa, Kuwaisinjaq qadha center, Shaqlawa qadha center, andArbil qadha center at 3 percent or less. The highest poverty rate is in Siakan nahiya, where 11 percent of the population lives below the poverty line. But by far the highest number of poor are in Arbil qadha center, almost 20,000 poor persons, as compared to roughly 1,400 in Siakan, the nahiya with the highest headcount rate.

Sulaimaniya and Diyala

Sulaimaniya is a northern governorate of Iraq, part of the Kurdistan region, and has the lowest poverty rates in the entire country. In more than two-fifth of its nahiyas, estimated poverty rates are 2 percent or lower; and all but two nahiyas have headcount rate of less than ten percent. The nahiya with the highest number of poor persons is Sulaimaniya qadha center; with an estimated poverty rate of 0.5 percent and a population of approximately 600,000 it has around 3,000 poor persons.

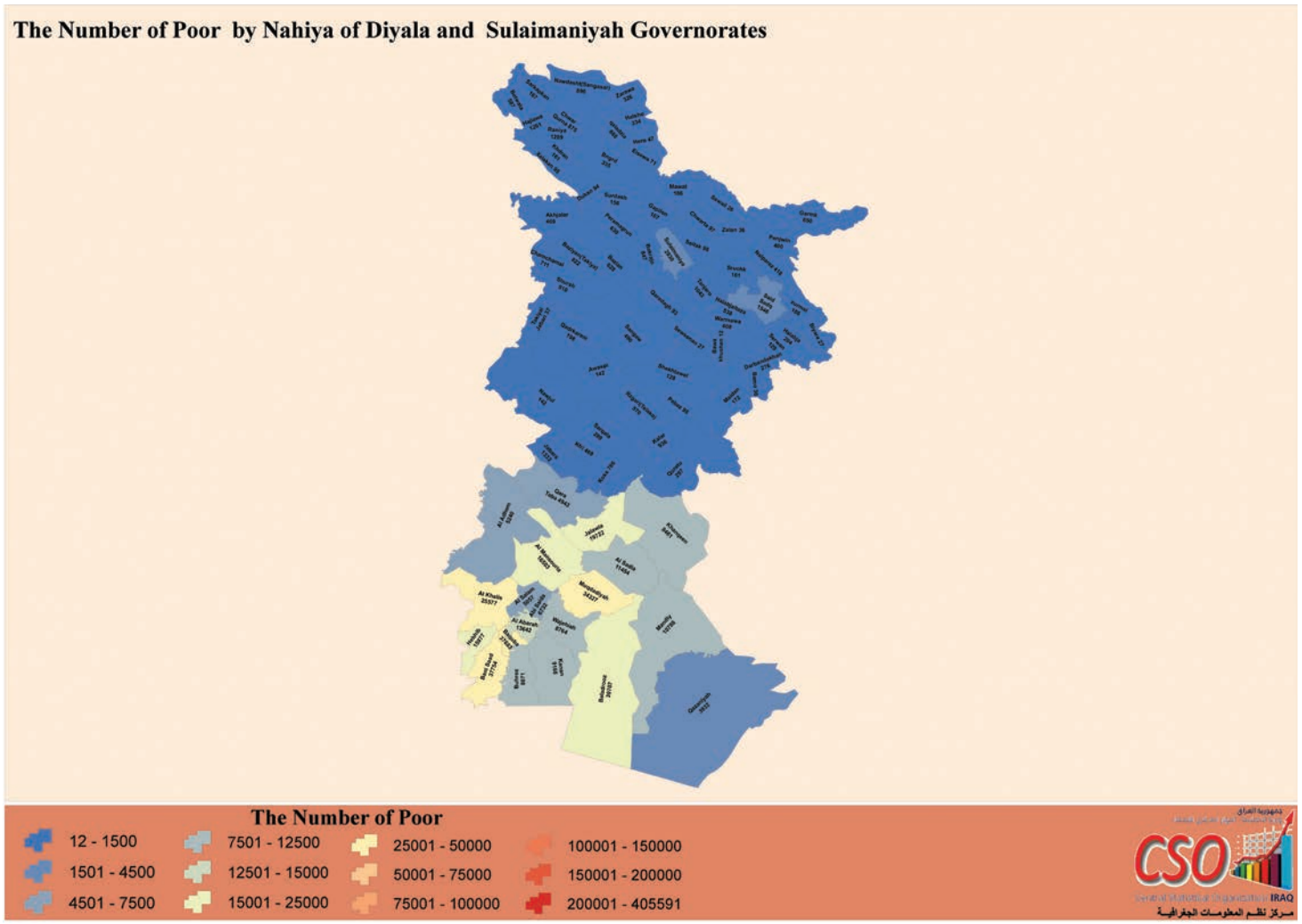
Diyala province lies south of Sulaimaniya and north east of Baghdad, and also borders Iran to its east. Along with Anbar and Nineveh, it continued to experience violence between

FIGURE 8: Headcount rate – Diyala and Sulaimaniyah



2007 and 2012. The nahiya with the least poverty rate in Diyala is Khanaqin qadha cente which has a headcount rate of approximately 10 percent. Baquba nahiya, where the governorate capital is located, has the second lowest headcount rate in Diyala—15 percent—but accounts for 38,000 poor persons because of its population of 260,000. Five nahiyas have headcount rates above 25 percent, with the highest rate of 32 percent in Mendili nahiya. Besides Baquba, four other populous nahiyas account for a large number of poor persons in Diyala—Al-Muqdadiya (34,000), Baladrooz (21,000), Al-Khalis qadha center (26,000), and Beni Saad (38,000).

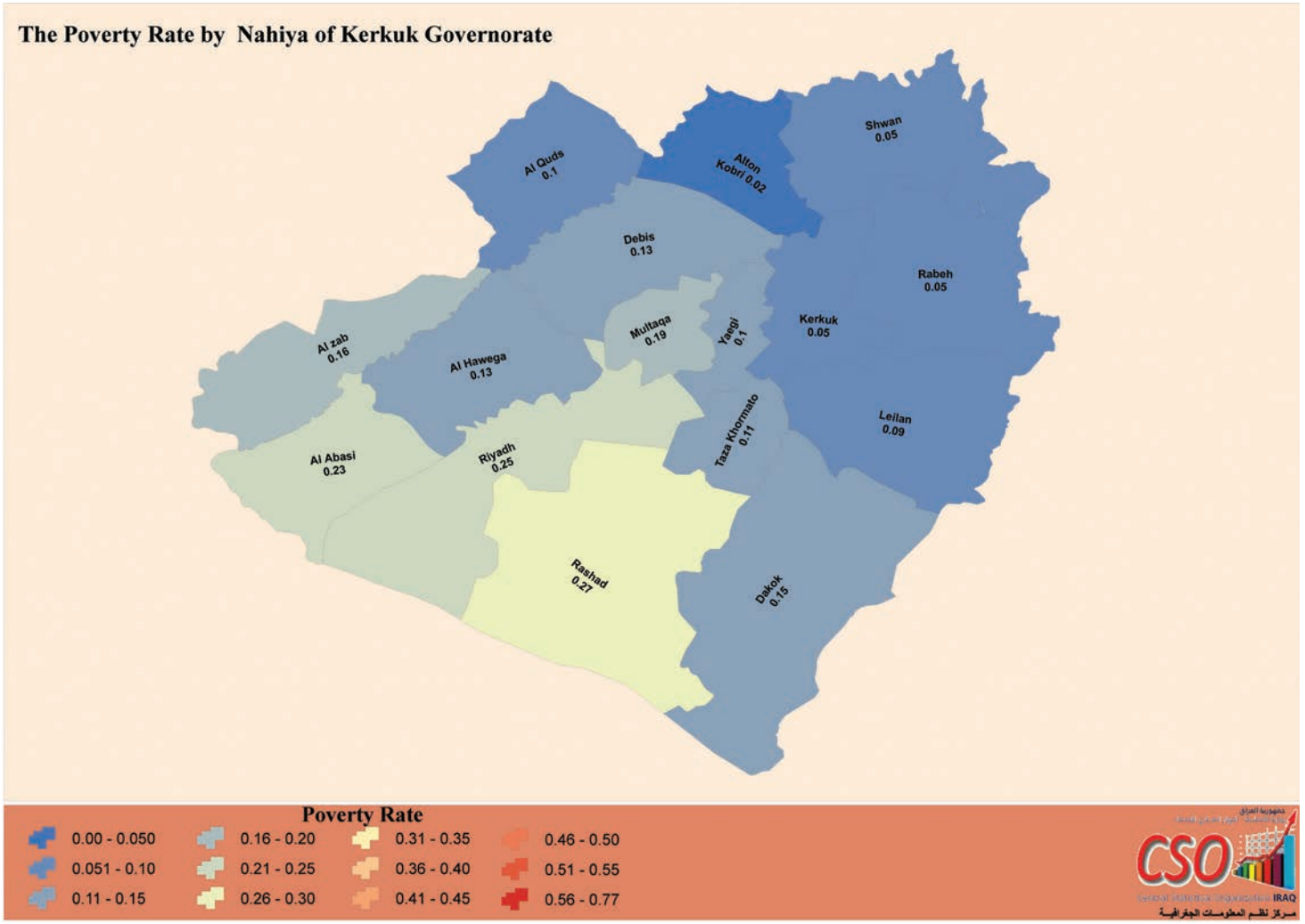
FIGURE 9: Number of poor – Diyala and Sulaimaniyah



Kirkuk

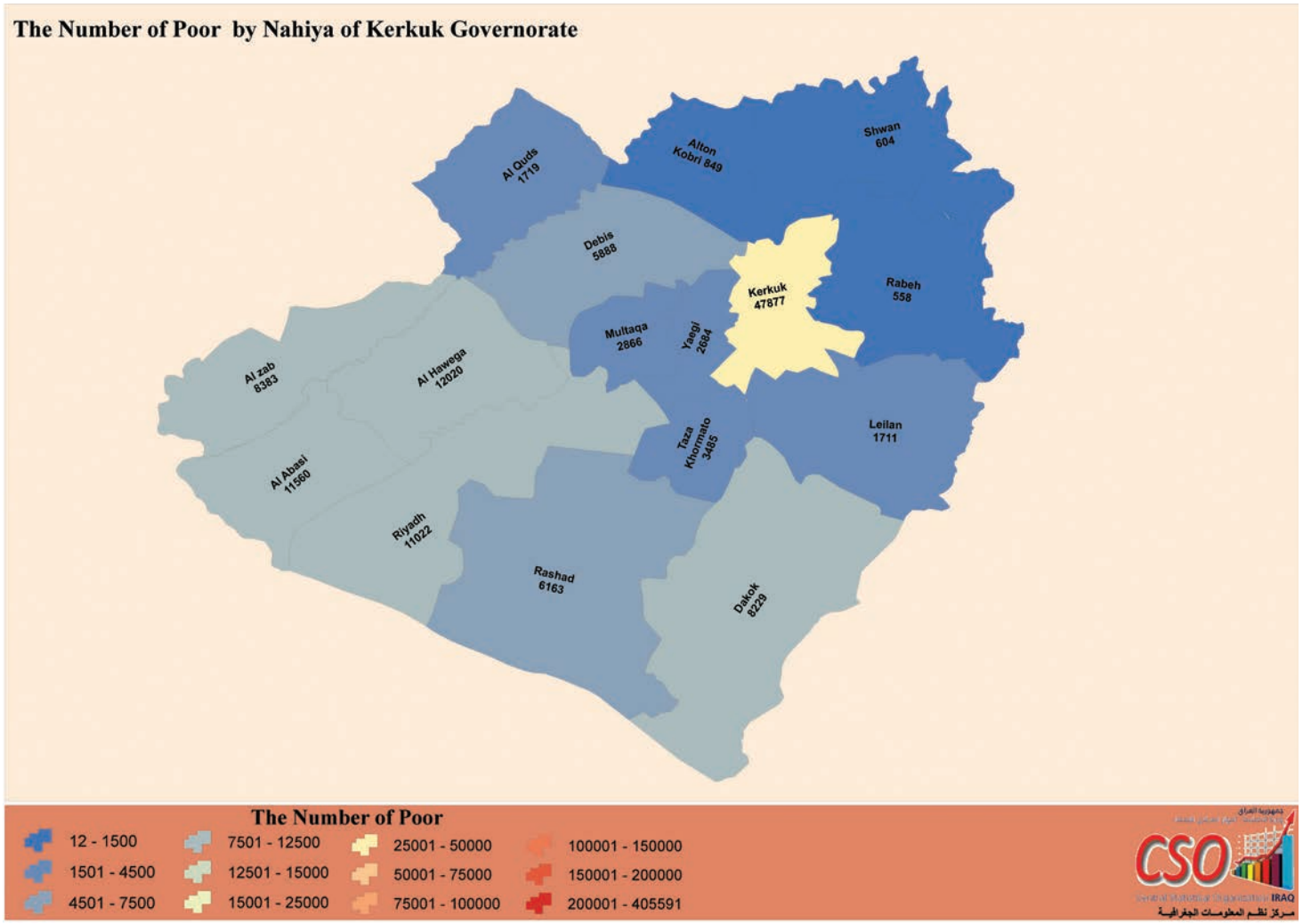
Kirkuk governorate is located east of Nineveh and south west of the Kurdistan region. More than a third of the nahiyas in Kirkuk have poverty rates less than 10 percent including the capital Kirkuk qadha center. About a quarter of the nahiyas have estimated headcount rate higher than 20 percent, all of whom are on the border with Salahadin. Headcount rates increase gradually from single digits to teen and twenties as one moves from north east to south west away from the Kurdistan

FIGURE 10: Headcount rate – Kirkuk



border. Despite very low headcount rates of 5 percent, the nahiya with the largest number of poor people is Kirkuk qadha center which is home to almost 900,000 people and almost 48,000 poor persons. In contrast, the nahiya with the highest headcount rate—Al-rashad—has only slightly more than 6,000 poor people because it has only 23,000 residents.

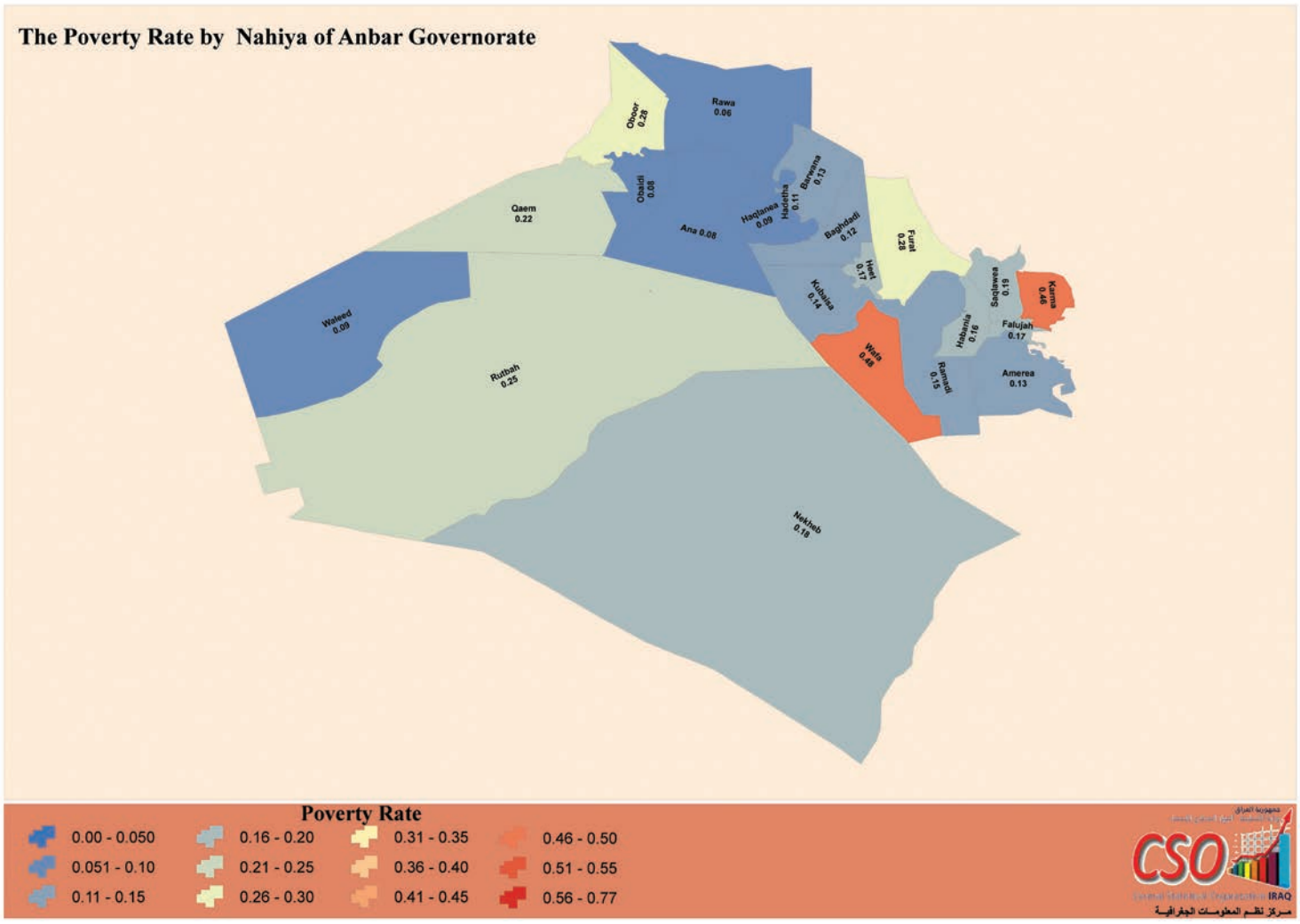
FIGURE 11: Number of poor – Kirkuk



Anbar

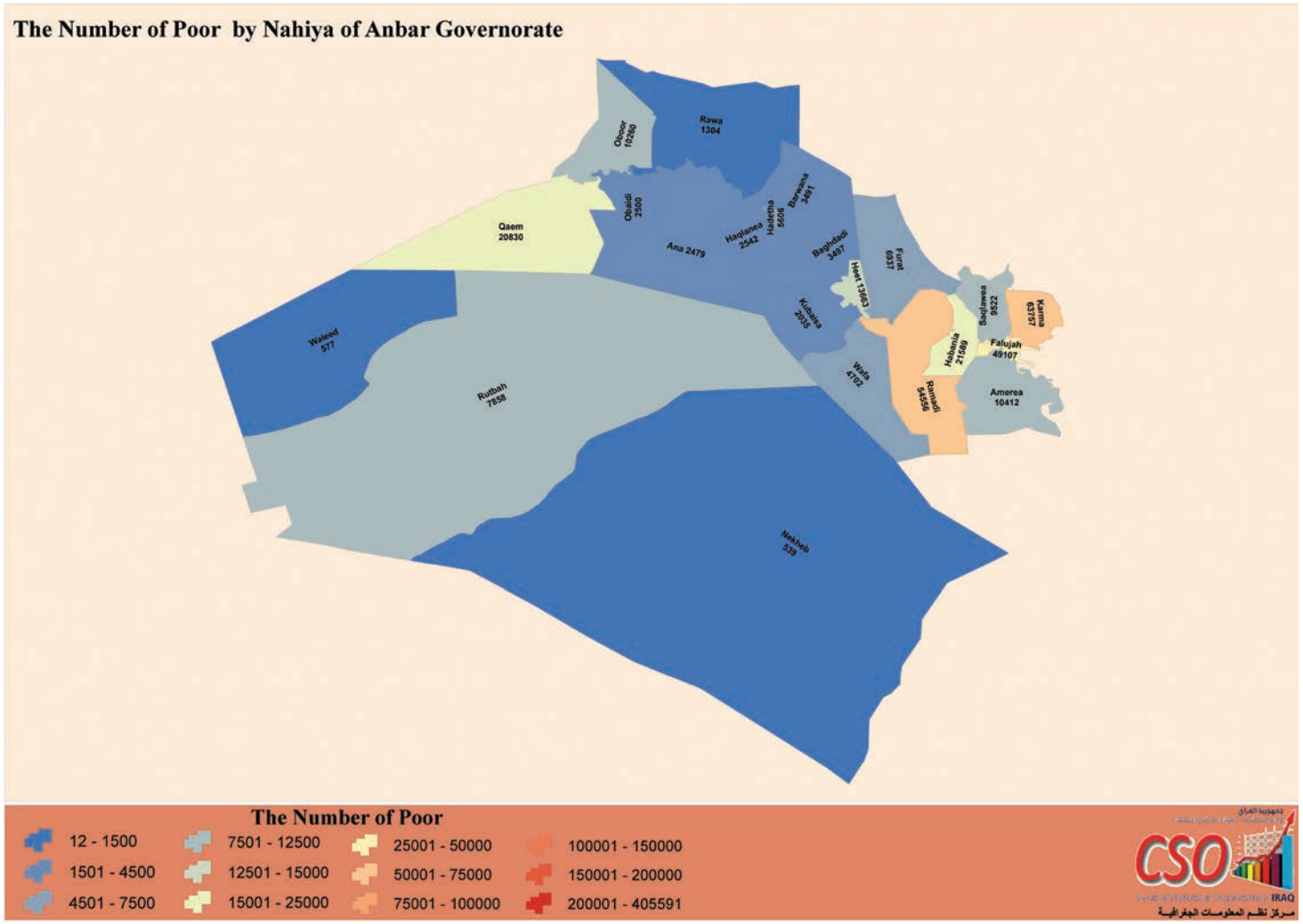
Anbar is Iraq's largest province in terms of geographic area and shares borders with Syria, Jordan and Saudi Arabia. However, it is also the most sparsely populated. Poverty estimates vary widely across the governorate. Al-Garma and Al-Waffa nahiyas, for instance, which border Baghdad and Kerbala respectively, have poverty rates as high as 46 and 48 percent while Rawa qadha center has a poverty rate as low as 6 percent. Moreover, poverty rates are not negligible in the 4 largest nahiyas—Al Ramadi (15 percent), Al Habbaniya (16 percent), Al Falluja (17 percent) and Al-Garma (48 percent)—implying that these four

FIGURE 12: Headcount rate – Anbar



alone account for 63 percent of Anbar's poor, with Al-Garma, Al-Fallujah, and Al-Ramadi each accounting for at least 16 percent of all the poor in Anbar.

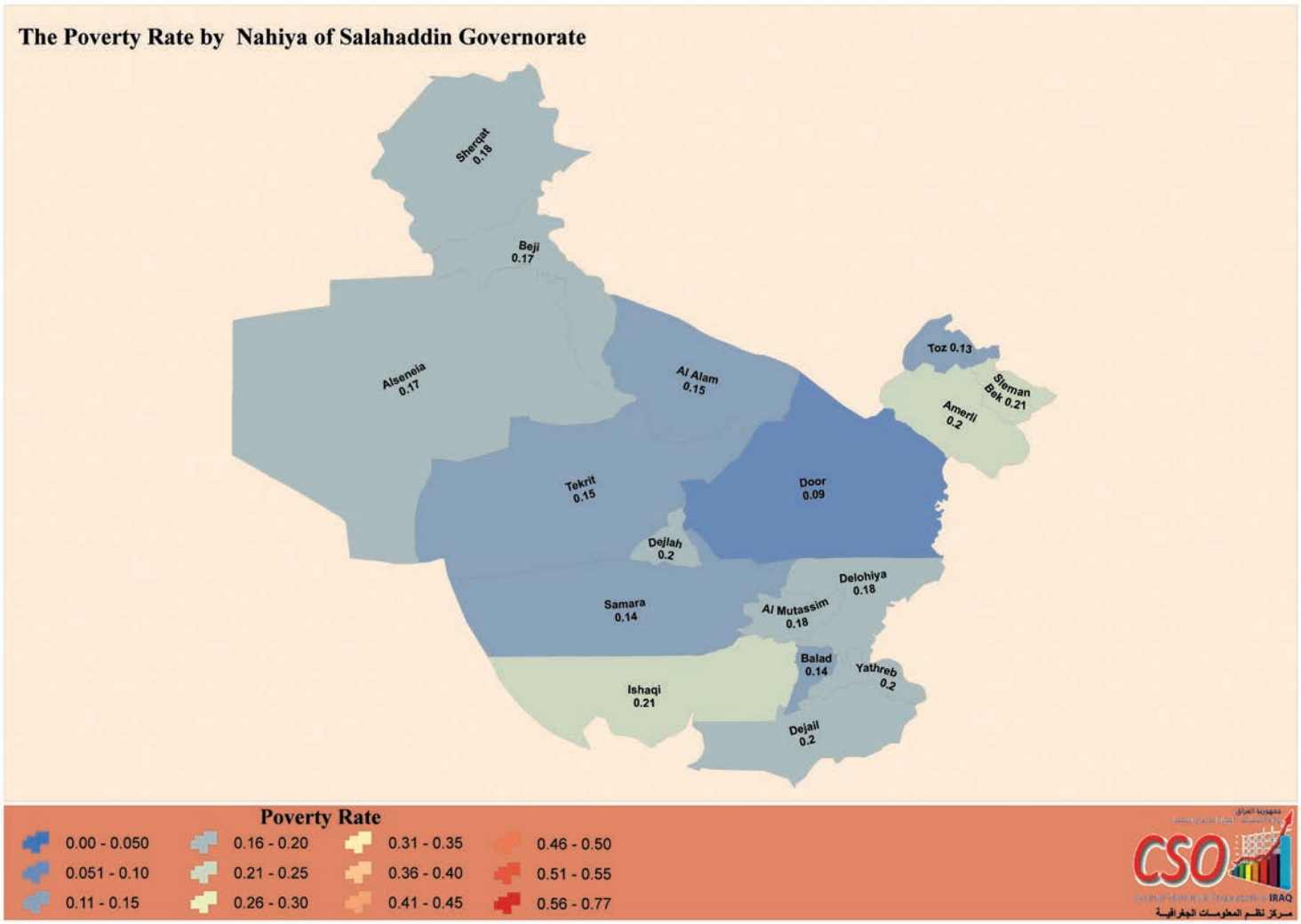
FIGURE 13: Number of poor – Anbar



Salahaddin

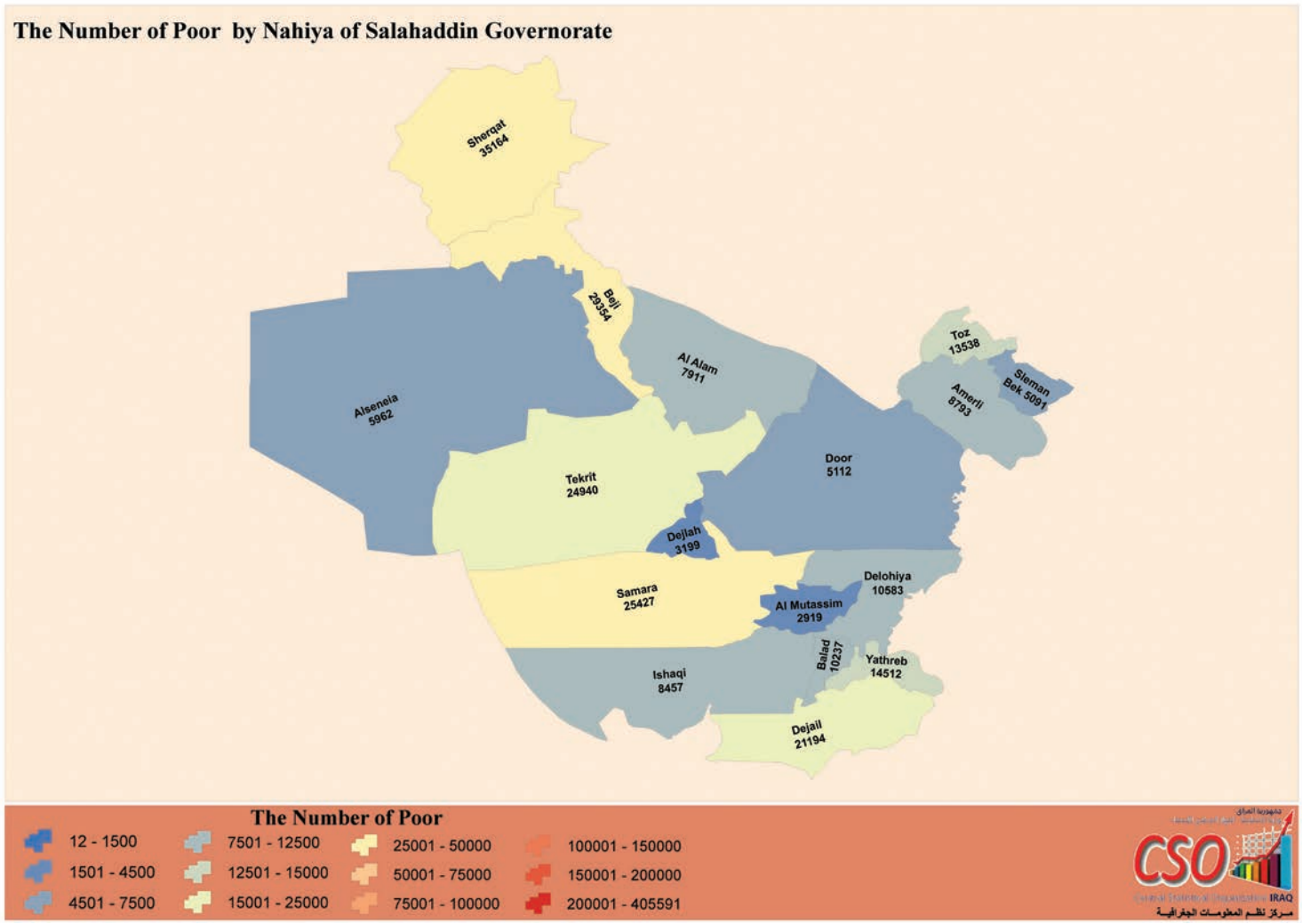
Salahadin governorate lies north of Baghdad, bordered by Anbar on the west and Diyala on the east. Estimates poverty rate in Salahaddin is 16.3 percent, but outside of Kurdistan, it is one of the governorates with the lowest variance in headcount rate across nahiyas. The nahiya with the highest headcount rate—Sulaiman Baig nahiya—has a headcount rate of 21 percent while Al-Daur qadha center, the nahiya with the lowest headcount rate, has 9 percent. The two most populous nahiyas

FIGURE 14: Headcount rate – Salahaddin



are Samarra (182,000) and al-Shirqat (200,000) with poverty rates of 14 and 18 percent and 25,000 and 35,000 poor persons respectively. Together, the two nahiyas account for more than a quarter of all the poor in Salahaddin.

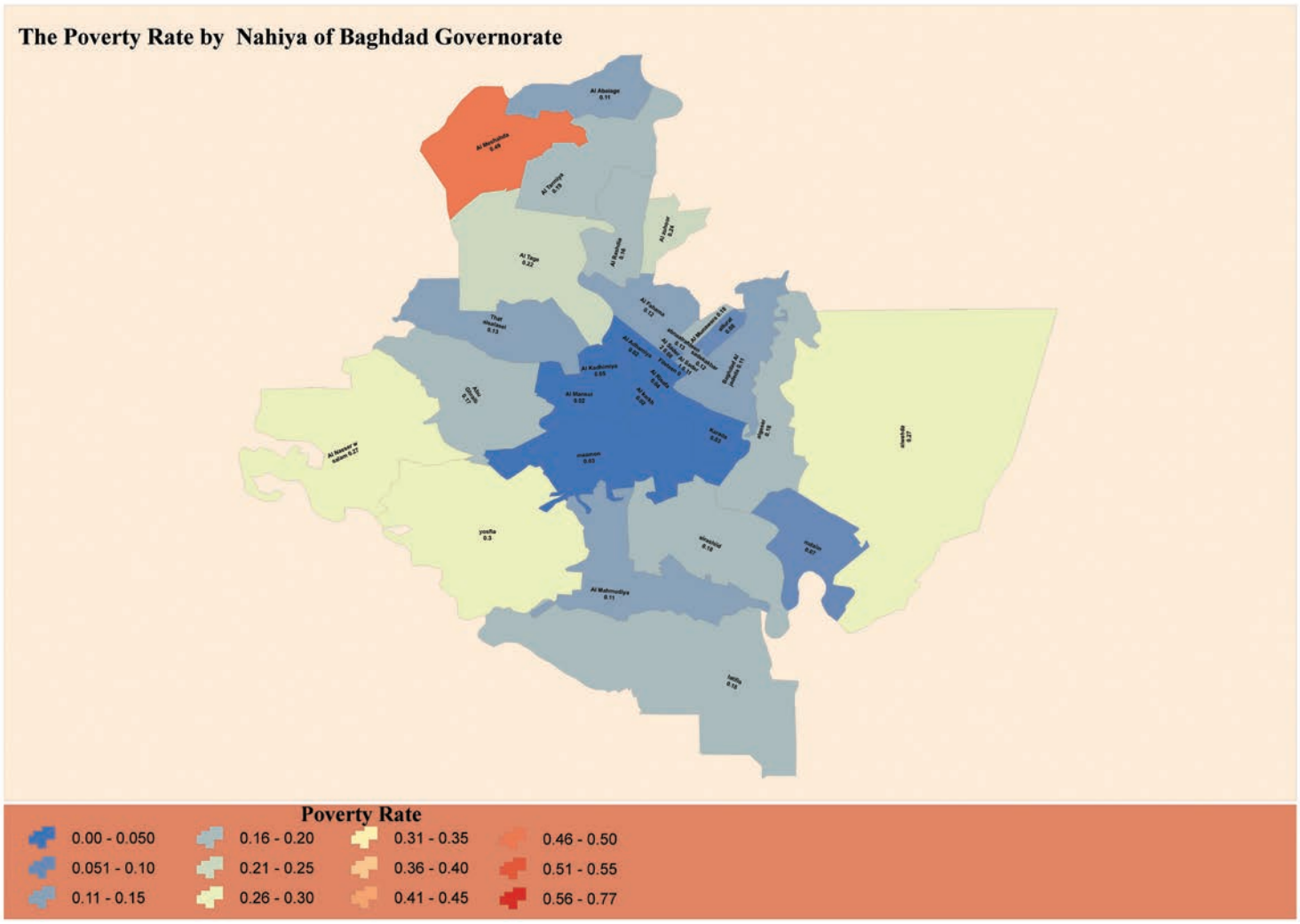
FIGURE 15: Number of poor – Salahaddin



Baghdad

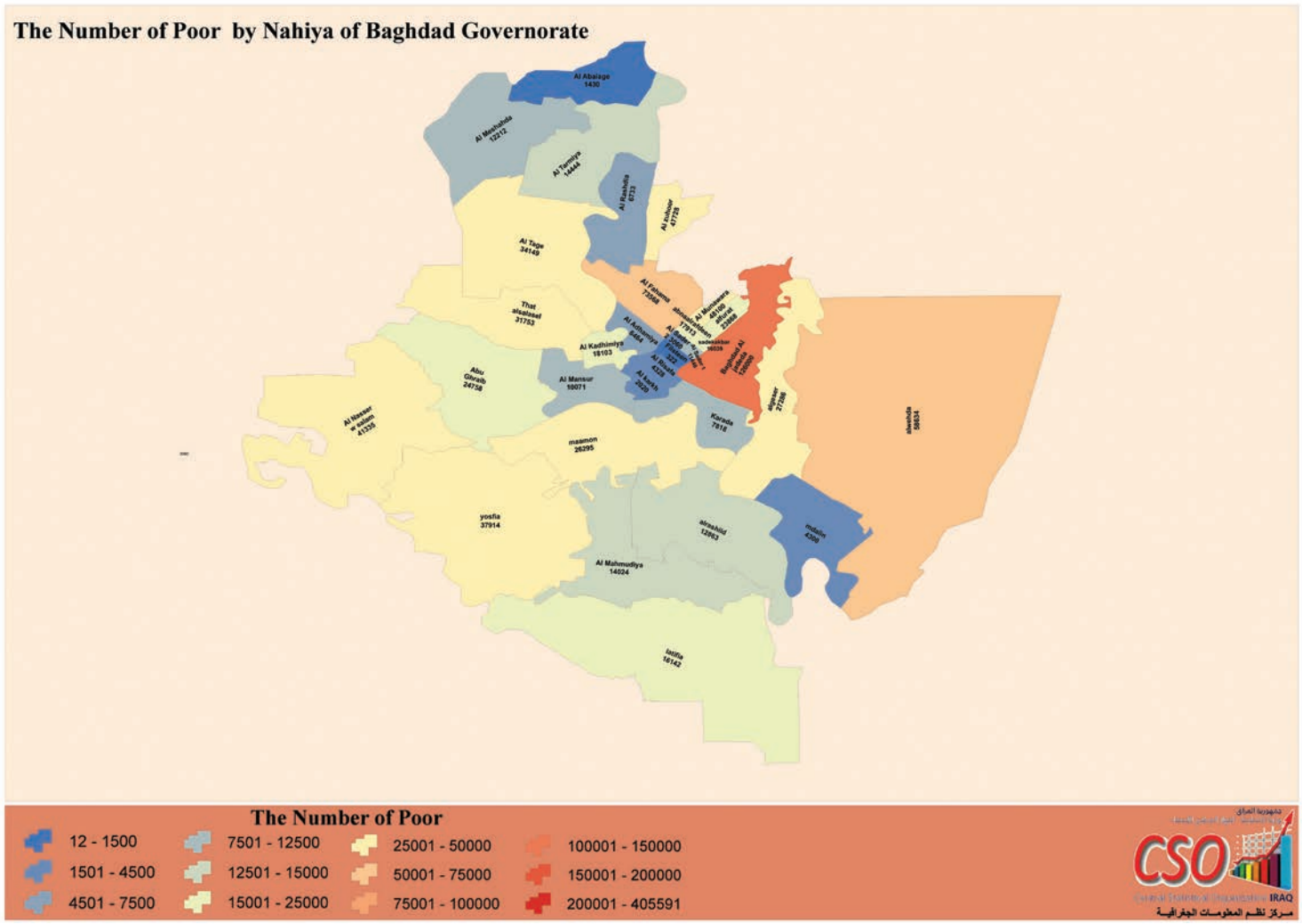
Baghdad is Iraq's smallest governorate in terms of geographical area but it is also one of its most populous. The governorate alone accounts for one-fifth of Iraq's population and 12 percent of Iraq's poor. Its 32 nahiyas show stark differences in welfare levels. The five least poor nahiyas—Palestine, Al-Adhamia, Al-Karkh, al Mansour, and al-Karrda al-Sharqia—have estimated rates of poverty of less than 3 percent. The poorest nahiyas—al-Mishdada (near Fallujah)—on the other hand,

FIGURE 16: Headcount rate – Baghdad



has a very high poverty rate of 49 percent. The largest nahiya in terms of population, Baghdad al-Jadeeda, with 1.14 million people, and an estimated poverty rate of 11 percent, alone accounts for almost 126,000 poor persons, the highest in Baghdad, or 15 percent of the poor in the governorate.

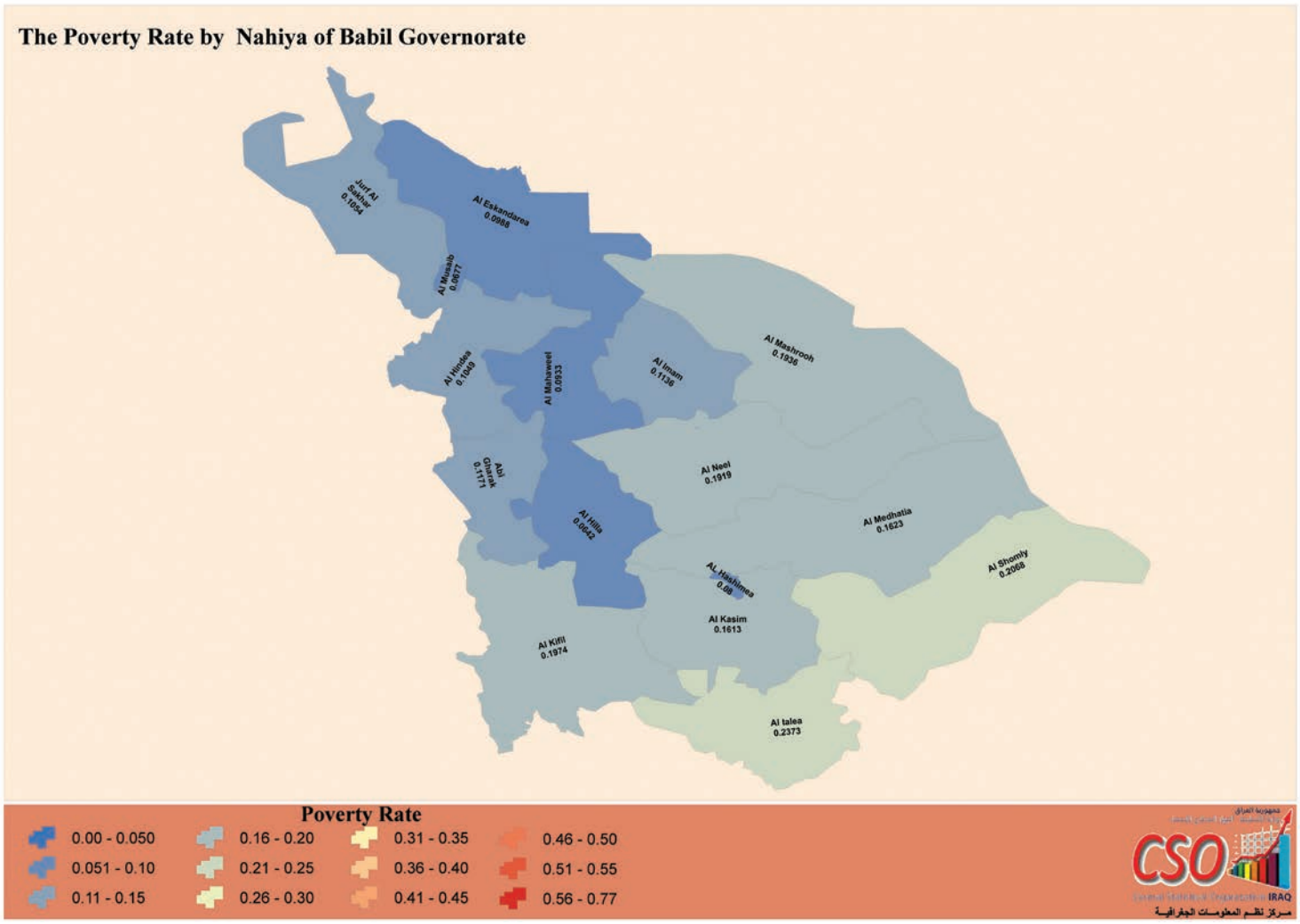
FIGURE 17: Number of poor – Baghdad



Babylon

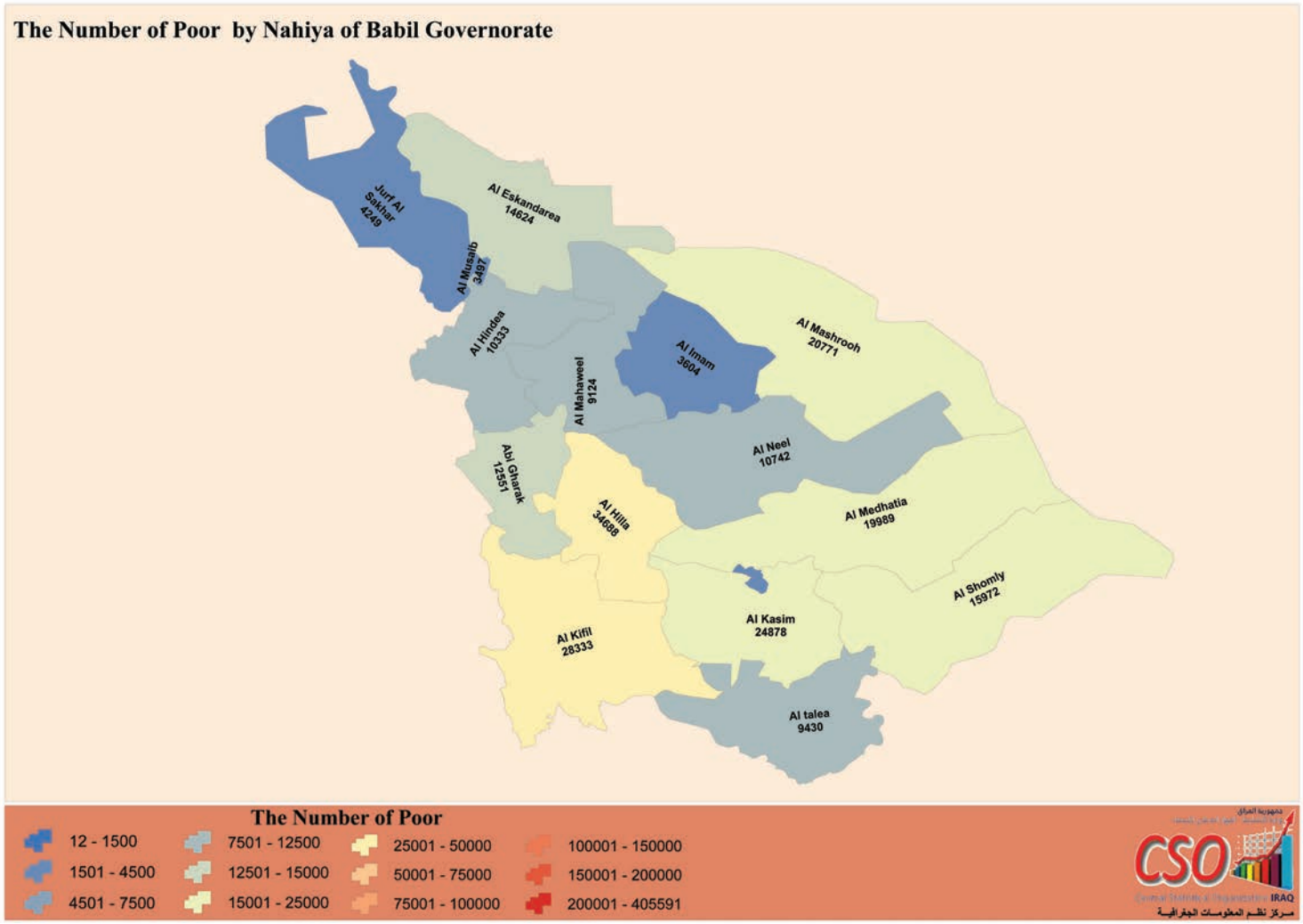
Babylon province in central Iraq is located just south of Baghdad. Overall, poverty rates in the governorate are low (12.2 percent); eleven of sixteen nahiyas have poverty rate below the national average. Al-Hilla qadha center, the capital of the governorate with a population of 540,000, has the lowest estimated poverty rate in the governorate of 6 percent, but accounts for the largest number of poor people—around 35,000 persons. At the other end, al-Talea'a nahiya, bordering Qadisiya

FIGURE 18: Headcount rate – Babylon



governorate, has a relatively high poverty rate with almost a quarter of its population, or more than 9,000 people, living below the poverty line. Three nahiyas with the most number of poor—Al-Qasim, Al-Kifl, and Al-Hilla—together account for more than two-fifths of the poor in the governorate. Because of the low poverty incidence, Babylon accounts for 4.5 percent of the poor in Iraq although it is home to 6.9 percent of the population.

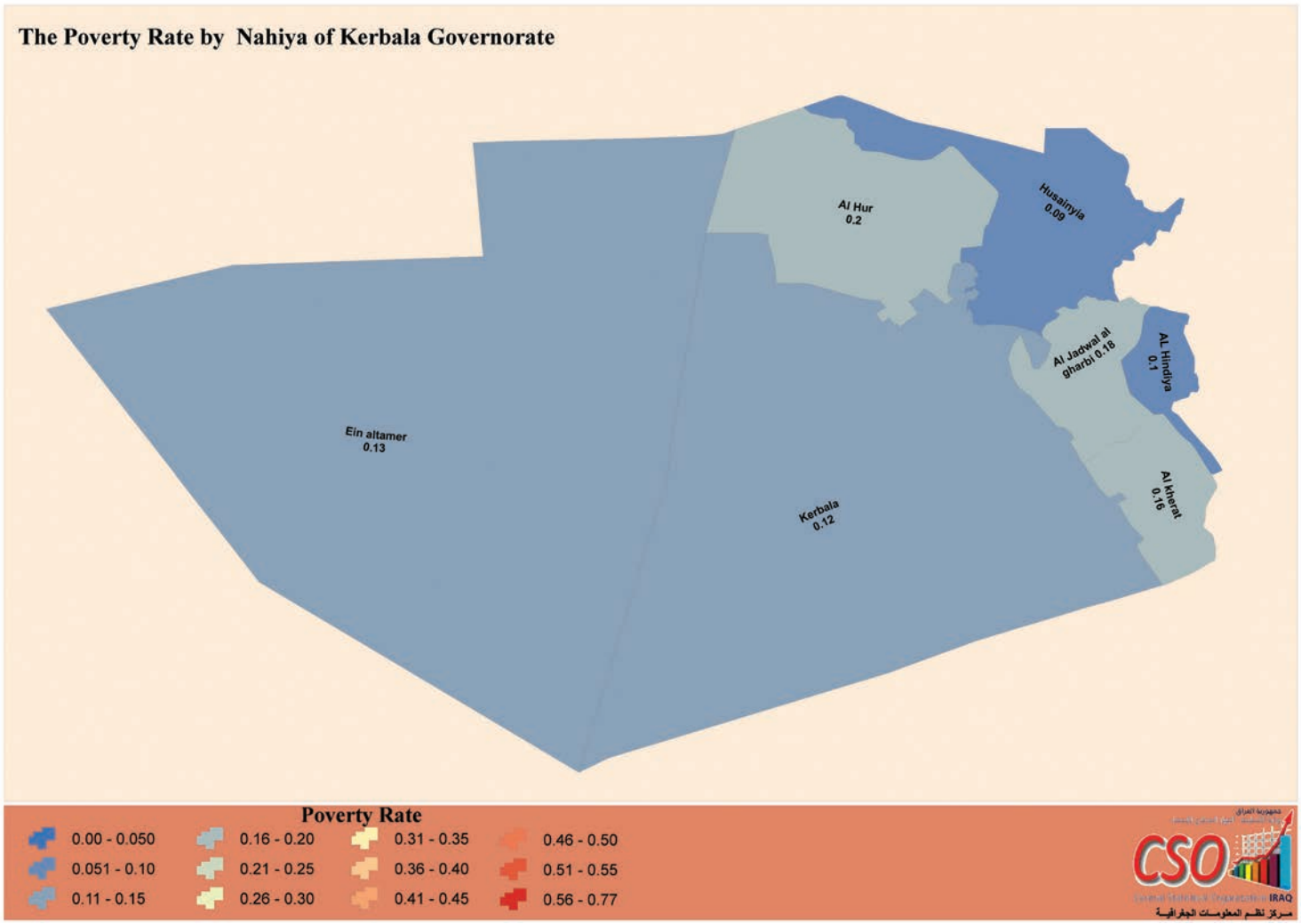
FIGURE 19: Number of poor – Babylon



Kerbala

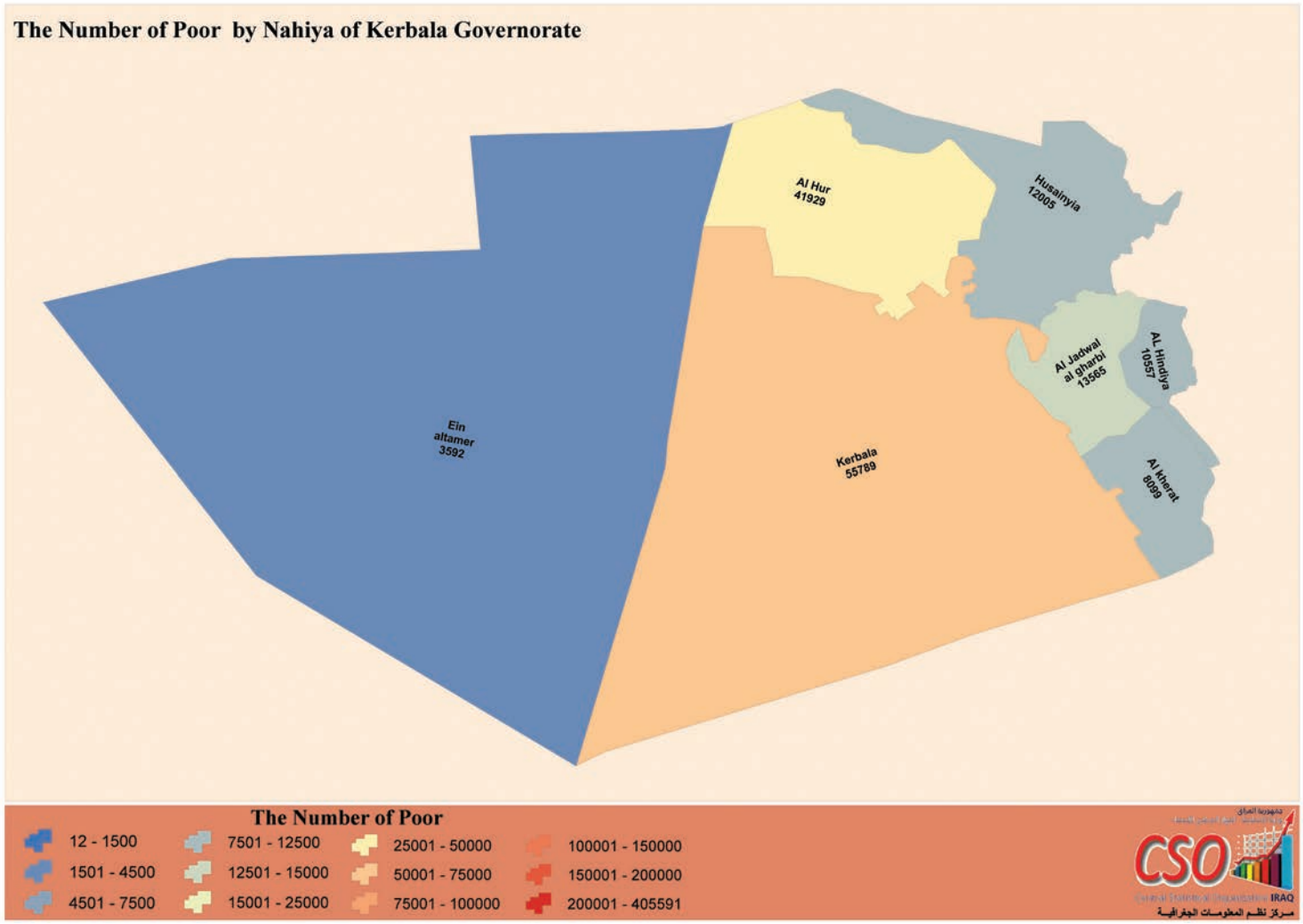
Kerbala governorate, located east of Anbar, and west of Najaf, lies in central Iraq. It is one of Iraq's smallest and least populated provinces (after Missan and Muthanna in the south). Between 2007 and 2012, it witnessed a significant decline in poverty rates, and overall poverty rate is now below the national average. Unlike many of the other governorates, there is relatively low variation in estimated poverty rates across nahiyas in the governorate, ranging from 9 percent in al-Hassaniya nahiya to

FIGURE 20: Headcount rate – Kerbela



20 percent in al-Hur nahiya. The most populous nahiya, Kerbala qadha center (480,000), accounts for the largest number of poor persons, around 56,000 people which is about 38 percent of the poor in Kerbala. The share of poor persons in Kerbela is on par with its population: 3.2 percent of Iraqis and 2.3 percent of the poor reside in the governorate.

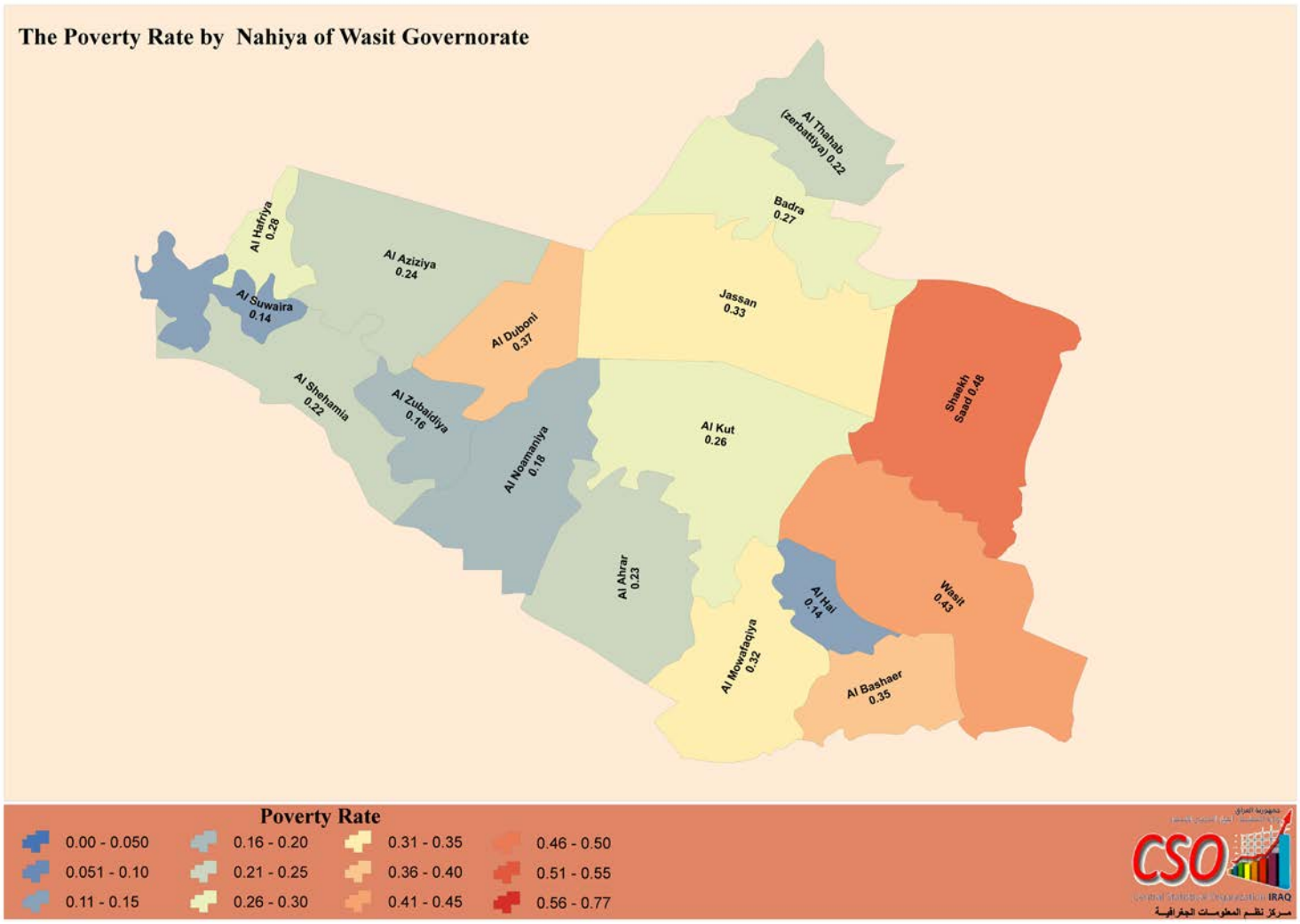
FIGURE 21: Number of poor – Kerbala



Wasit

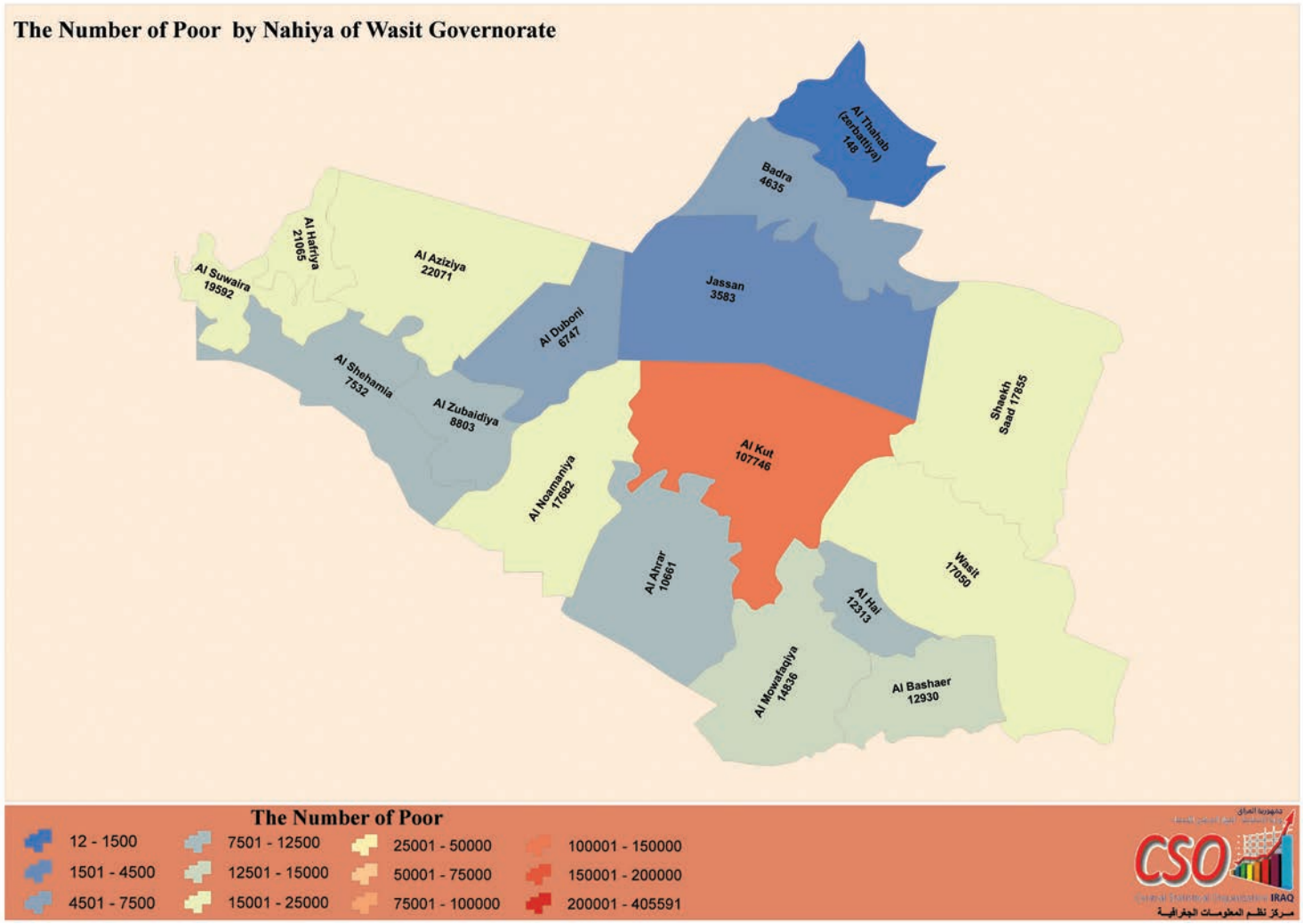
Wasit governorate shares its western border with Babylon province, and its eastern border with Iran. Thirteen of seventeen nahiyas in the governorate experience poverty rates above the national average. Even the capital, al Kut qadha center, has a quarter of its population below the poverty line, or 108,000 poor persons. The highest rates of poverty are in the eastern nahiyas bordering Iraq—Wasit (43 percent) and Sheikh Saad (48 percent)—where almost half the population is poor, but

FIGURE 22: Headcount rate – Wasit



because of their small population sizes, they account for only 35,000 poor persons. Overall, Wasit has 3.6 percent of the total Iraqi population and 4.8 percent of the poor.

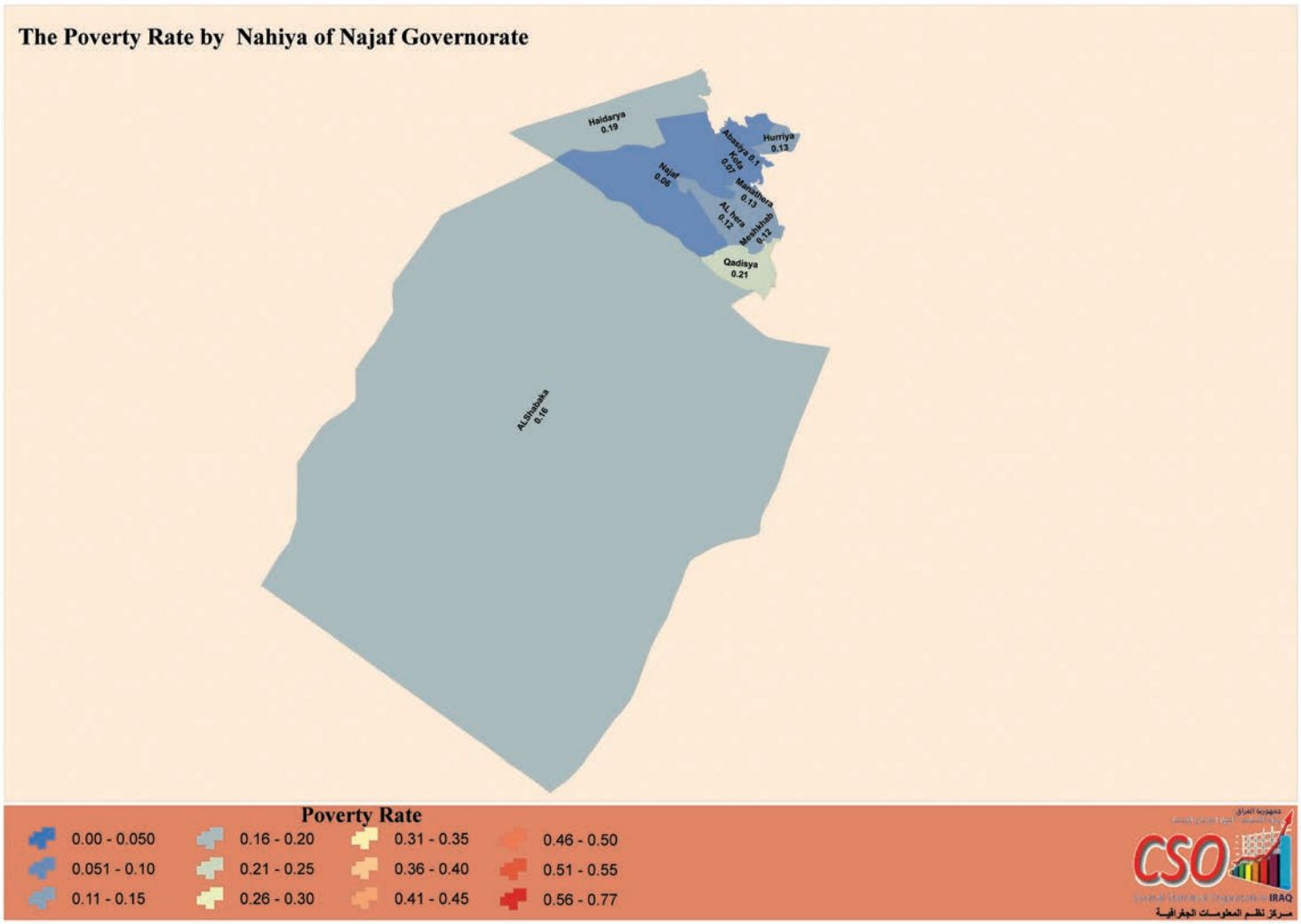
FIGURE 23: Number of poor – Wasit



Najaf

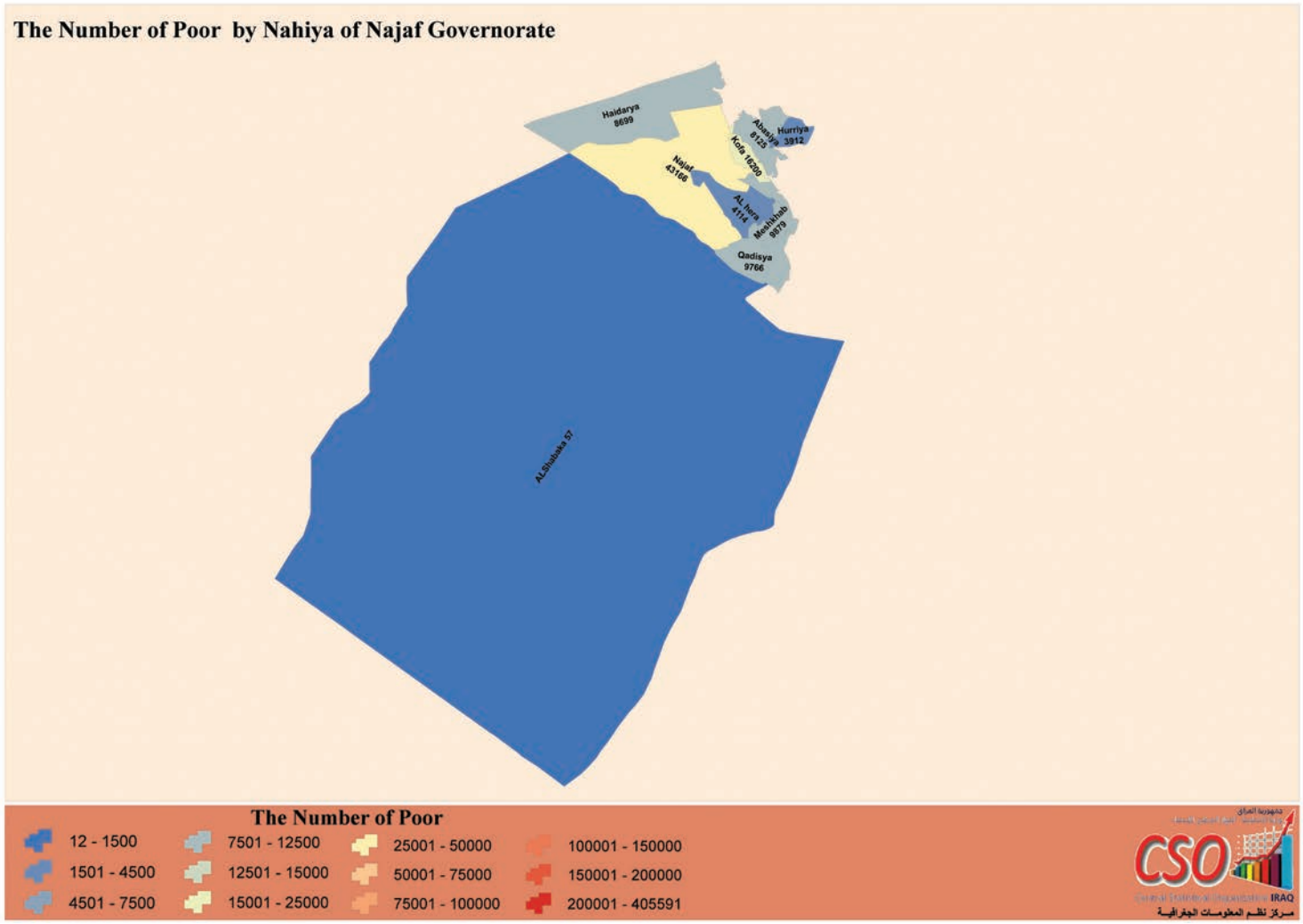
Najaf governorate, south of Kerbala, also experienced rapid declines in poverty between the 2007 and 2012 period, and now has one of the lowest poverty rates in the country. Within the governorate, there is little variation in estimated poverty rates, with the lowest rates of 6 percent in Najaf qadha center, and the highest of 21 percent in al-Qadisiya, with seven out of ten nahiyas having poverty rate less than 15 percent. Because of its high population share, Najaf qadha center, the capital, alone

FIGURE 24: Headcount rate – Najaf



accounts for 38 percent of the governorate's poor. Al-Shabaka nahiya is one of the least populous in the country, with much of nahiya being part of the Syrian desert, and an estimated population of only 356 persons of which 57 are estimated to be poor (16 percent). Najaf is home to 3.9 percent of the population and 1.8 percent of the poor.

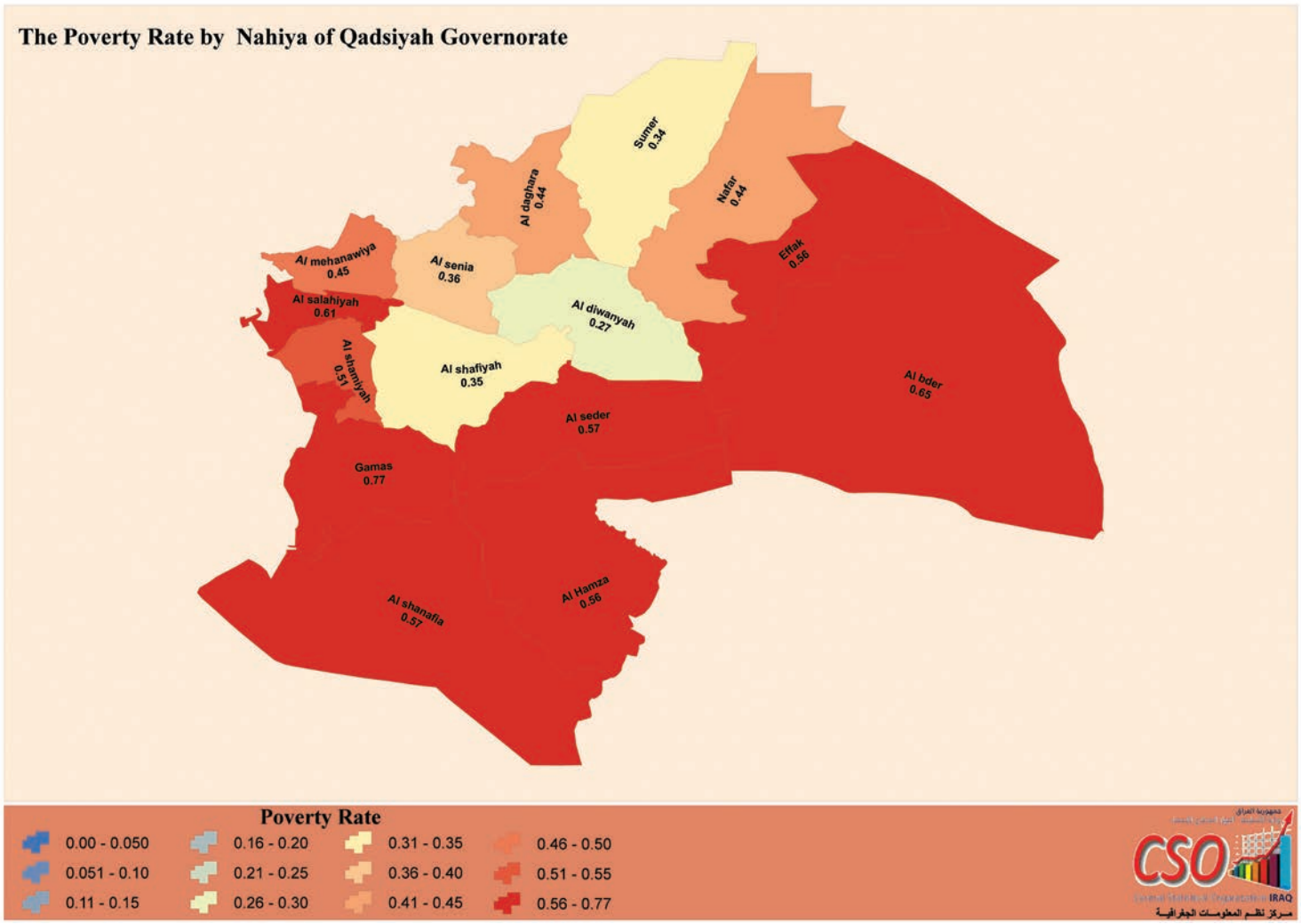
FIGURE 25: Number of poor – Najaf



Qadisiyah

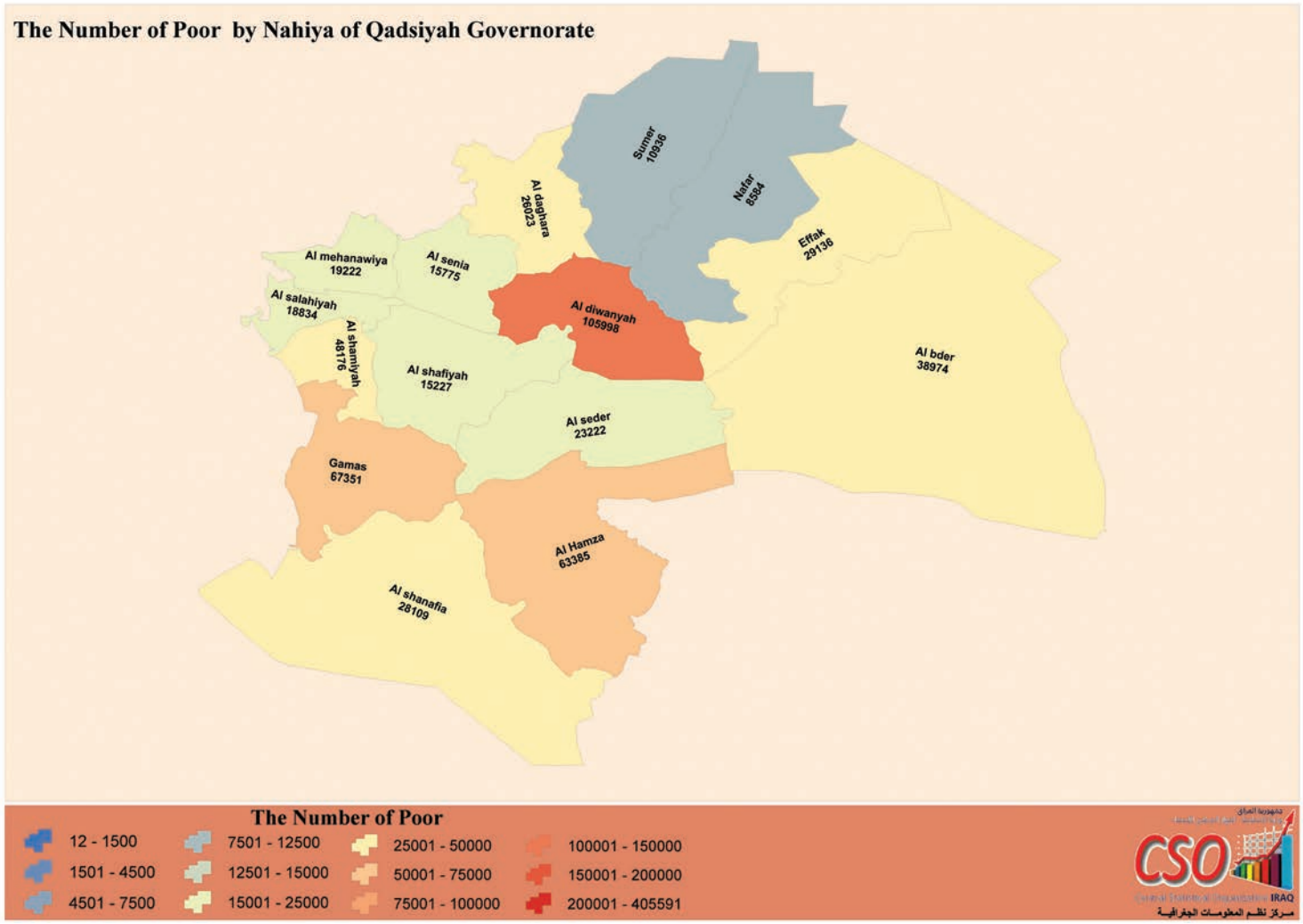
Qadisiya governorate, in south-central Iraq, was until 1976 part of the Diwaniyah governorate along with Muthanna and Najaf. It is one of the five poorest governorates in Iraq. Even the best-off nahiya, al-Diwaniya qadha center, has more than a quarter of its population living below the poverty line, almost 106,000 persons. Eight of fifteen nahiyas in the governorate have estimated poverty rates of 50 percent or more. By far the poorest is Gammas nahiya, with a headcount rate of 77 percent, which

FIGURE 26: Headcount rate – Qadisiyah



is also the poorest nahiya in the country. Indeed, 34 percent of Qadisiya's poor live in its five poorest nahiyas—Gammas, Al-Shinafiya, Al-Salahiya, Al-Badair and Al-Sadeer—and al-Diwaniya qadha center alone accounts for a fifth of the poor. High poverty incidence is reflected in the disproportionate number of poor in the governorate; while 3.4 percent of Iraqis resides in Qadisiyah, 8 percent of the poor lives here.

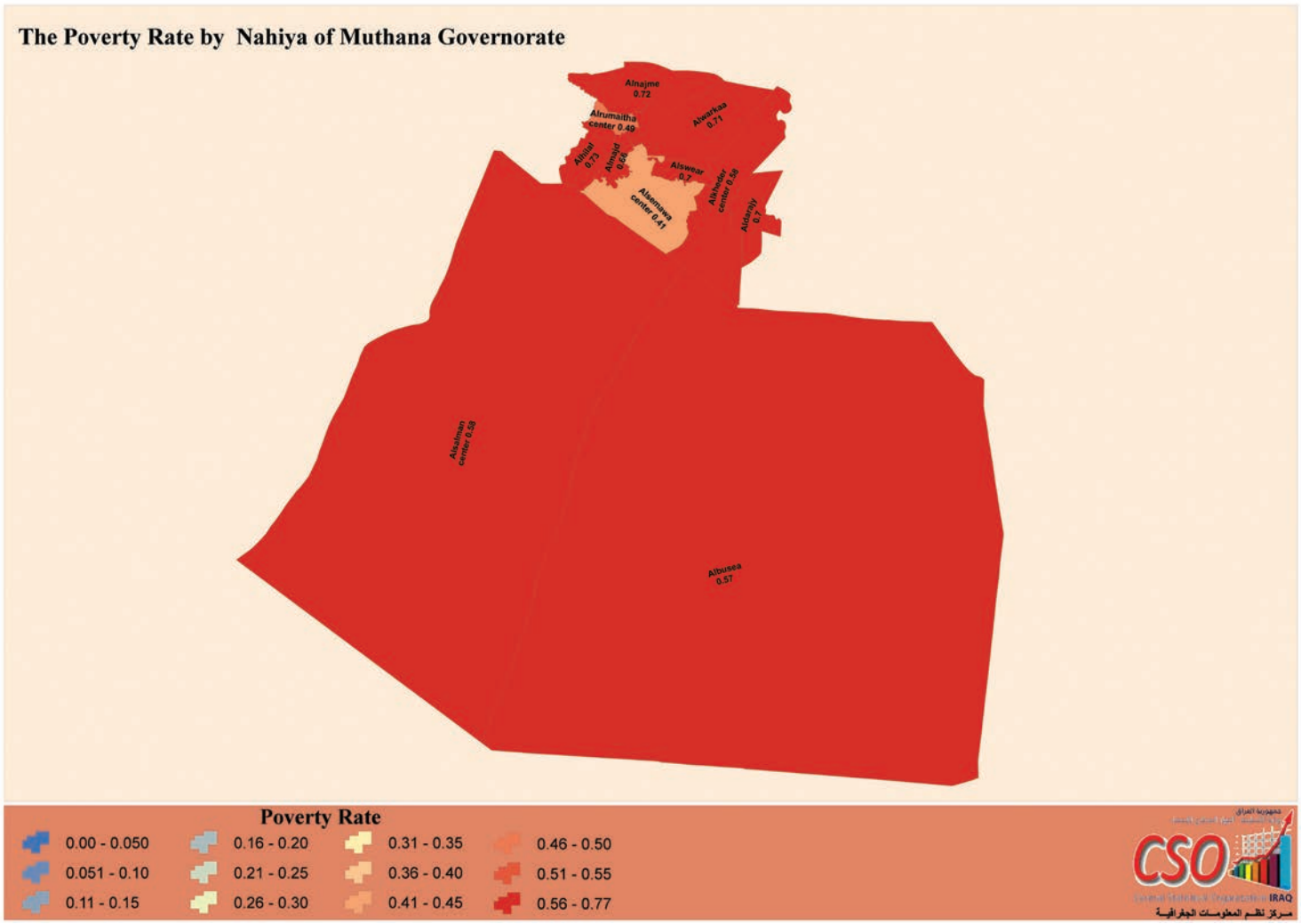
FIGURE 27: Number of poor – Qadisiyah



Muthana

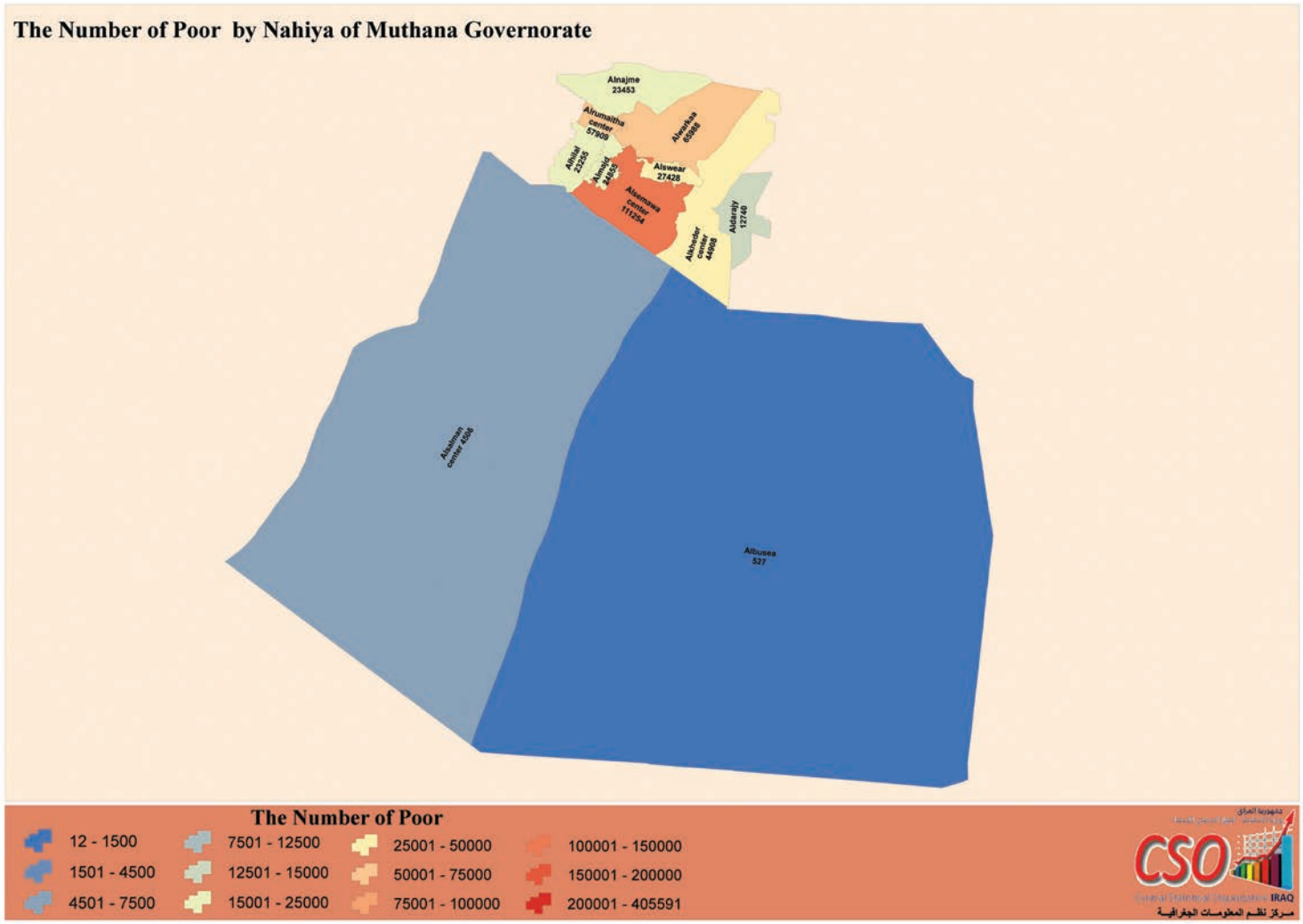
Muthanna governorate is located in southern Iraq and borders Saudi Arabia and Kuwait on the west and south. It is Iraq's poorest governorate, with even the best-off nahiya—al-Samawa qadha center—experiencing poverty rate of 41 percent. Nine out of eleven nahiyas in Muthanna have estimated headcount rate of more than 50 percent. The poorest three nahiyas—al-Warka, al-Najmi, and al-Hilal—with poverty rates of 71, 72 and 73 percent respectively, together account for 113,000 poor persons.

FIGURE 28: Headcount rate – Muthana



However, almost as many poor persons live in a single nahiya, al-Samawa qadha center, which is the most populous in the governorate. The proportion of poor Iraqis in Muthana is more than thrice that of the proportion of Iraqis in general, 6.4 percent versus 2.1 percent.

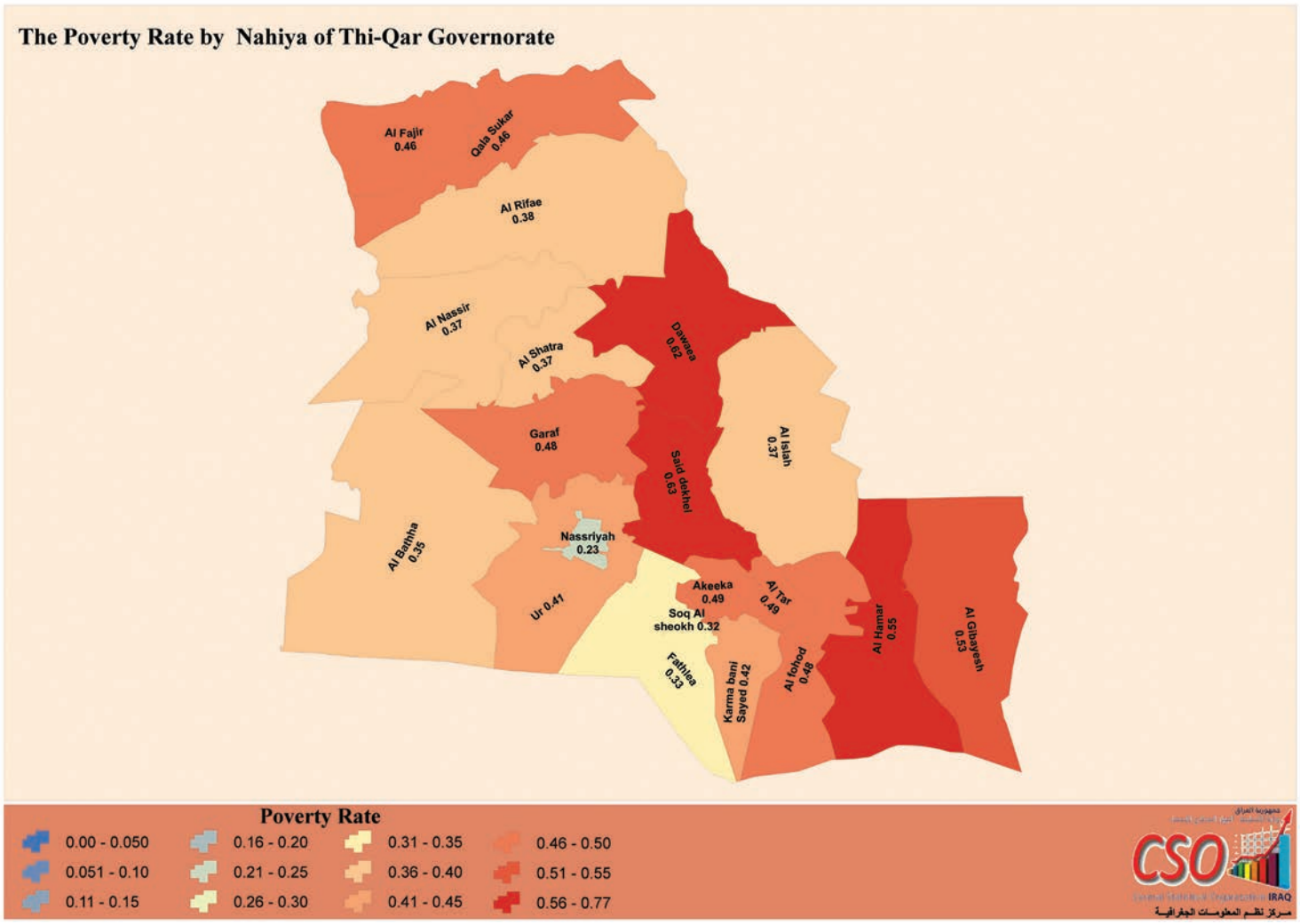
FIGURE 29: Number of poor – Muthana



Thi Qar

Thi Qar governorate in southern Iraq lies north of Basra and east of Muthanna. It is one of Iraq's poorest governorates, although there is significant variation in nahiya level estimates of poverty. For instance, the capital and most populous nahiya, al-Nasiriya qadha center, has a poverty rate of 23 percent. One-fifth of the nahiyas in the governorate have headcount rates above 50 percent and three-fifth of the nahiyas have poverty rates of more than 40 percent. The two poorest nahiyas, al-

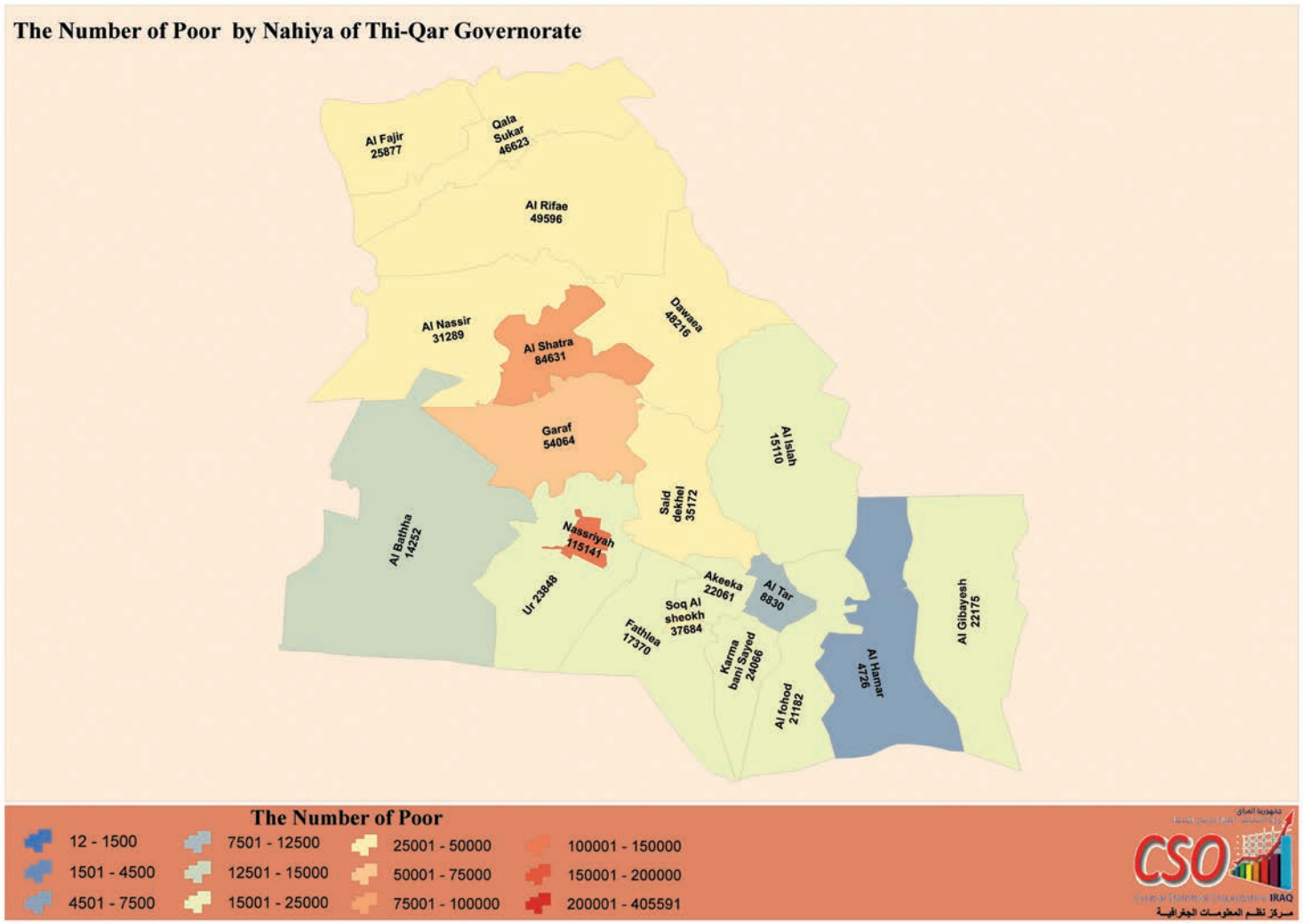
FIGURE 30: Headcount rate – Thi-Qar



Dawaya and Said Dekhil, have more than three-fifth of their population living below the poverty line.

Al-Nasiriya qadha center has the lowest headcount rate but highest number of poor people (115,000) because of its population size (499,000). This is apparent in Figures 30 and 31: Al-Nasiriya is shaded in "lightest" color in the headcount rate map while it has the "darkest" hue in the map for number of poor. Eleven percent of the country's poor lives in Thi Qar while it has only 5.5 percent of the country's population.

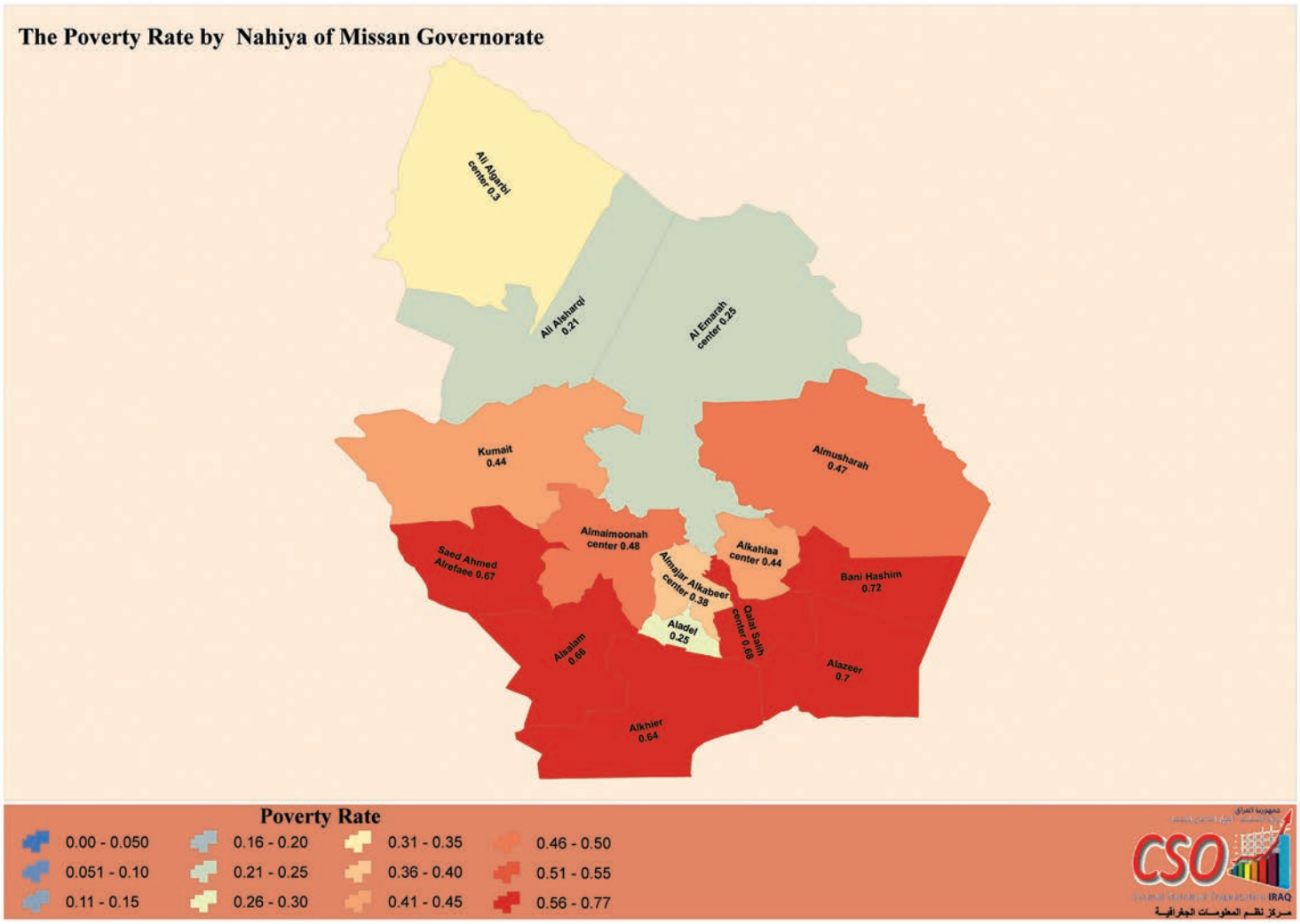
FIGURE 31: Number of poor – Thi-Qar



Missan

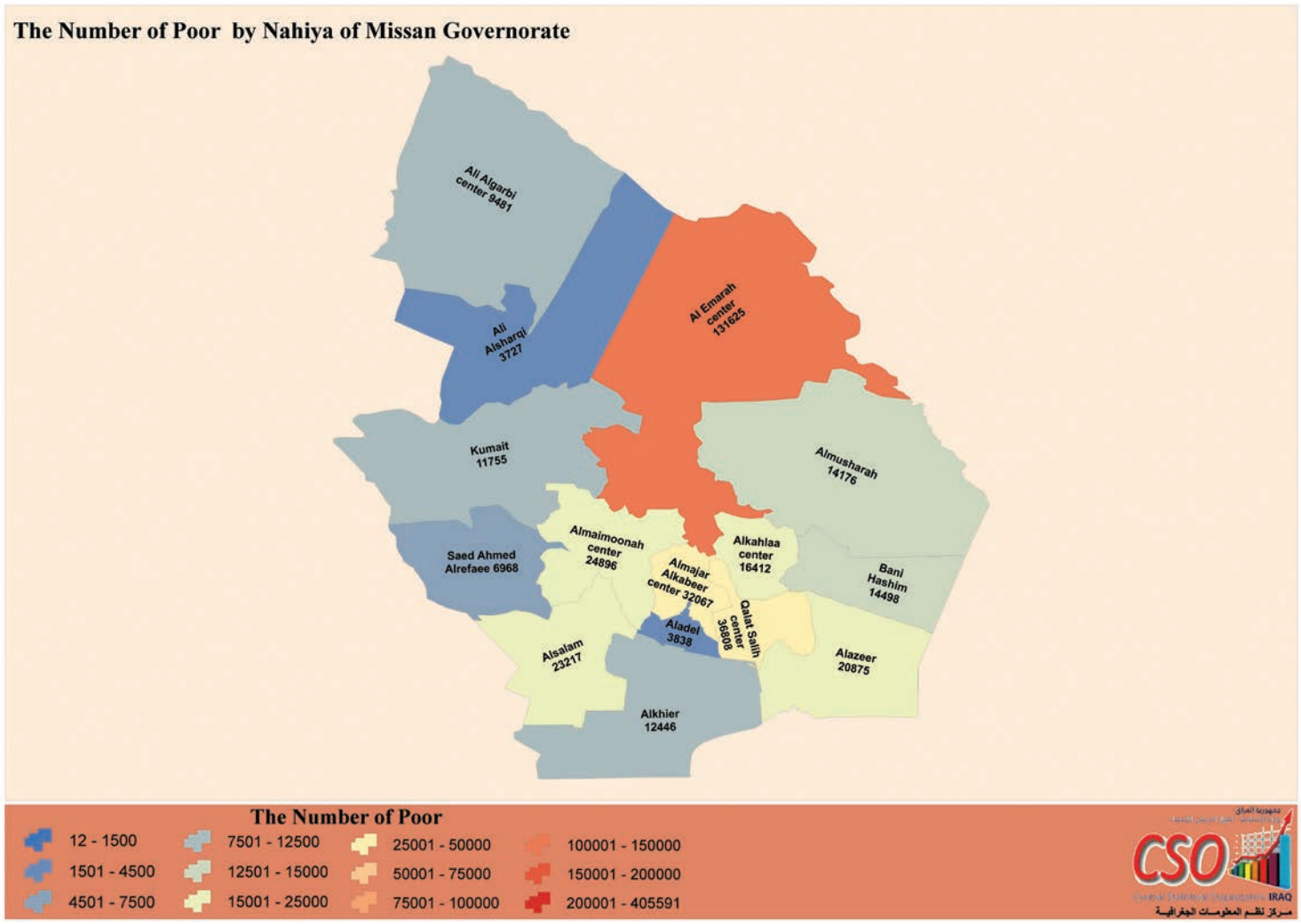
Missan lies in the southeast of Iraq, bordering Iran to the east, and Wasit, Thi-Qar, and Basrah governorates to the north, west, and south respectively. More than a third of Al Ahwar, or Mesopotamian Marshes, of south Iraq falls in Missan governorate. However, the loss of wetlands has led to desertification of arable lands and uprooted many Marsh Arabs from their traditional lands and livelihoods. Despite having rich oil reserve fields, Missan has one of the highest poverty rates in Iraq. The nahiya with

FIGURE 32: Headcount rate – Missan



the least headcount rate in Missan is Ali Al-Sharqi (21 percent) whose poverty rate is higher than the national average. More than a third of the nahiyas have headcount rate of more than 60 percent—Al-Khayr (64 percent), Al-Salam (66 percent), Said Ahmed Al-Rifaai (67 percent), Qalat Saleh qadha center (68 percent), Al-Ezair (70 percent), and Bani Hashim (72 percent)—with the two poorest nahiyas bordering Iran. The areas with the most number of poor are all urban centers—Al-Maimouna qadha center (25,000), Al-Mejar Al-Kabir qadha center (32,000), Qalat Saleh qadha center (37,000), and Al-Amara qadha center

FIGURE 33: Number of poor – Missan

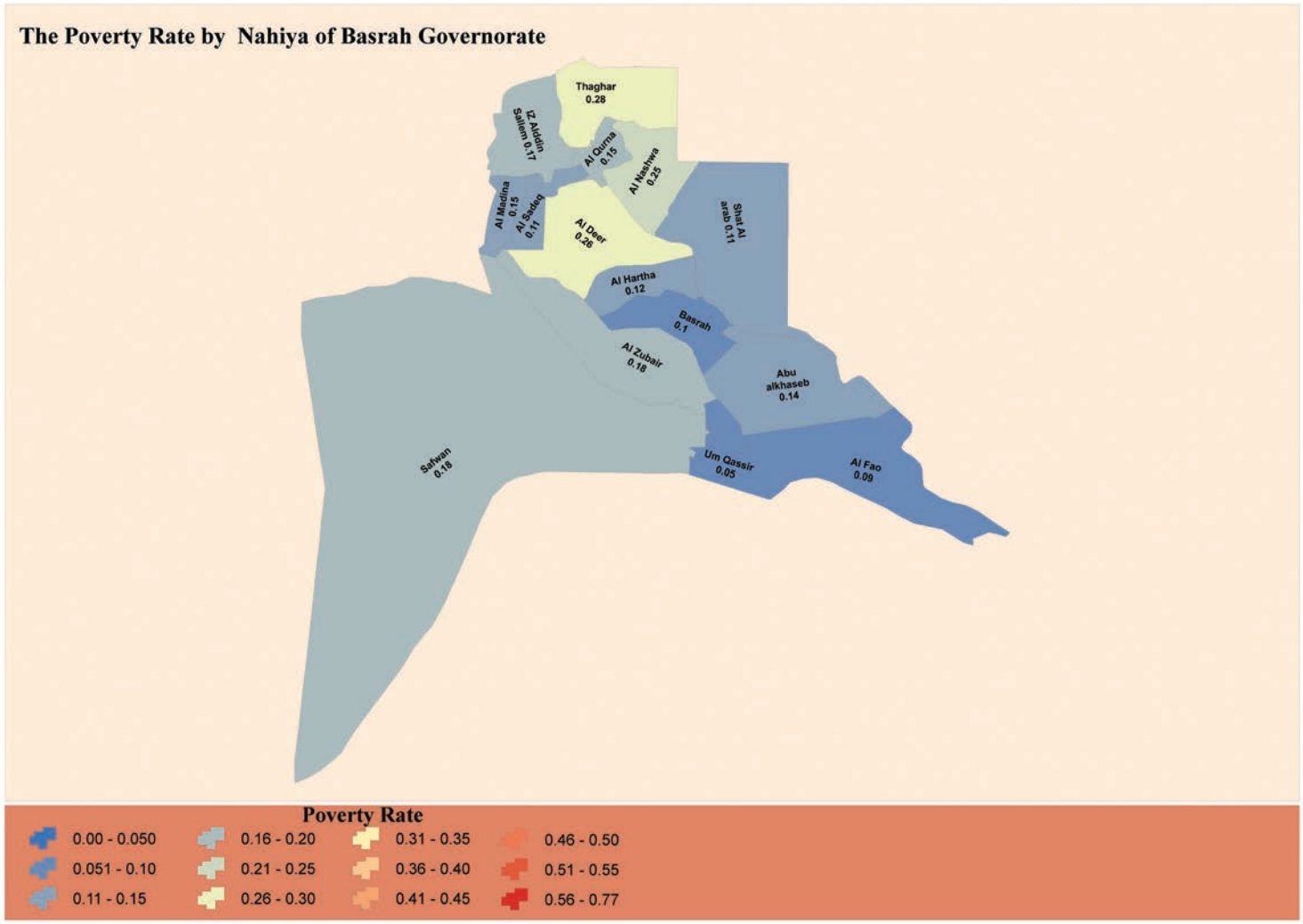


(132,000)—and together they account for 62 percent of the poor in Missan. The nahiya with the fewest number of poor is Ali Al-Sharqi, a product of its low headcount rate (21 percent) and small population size (18,000). Missan is another governorate that has a disproportionate share of the poor: it is home to 2.9 percent of Iraqis but 5.8 percent of the poor.

Basrah

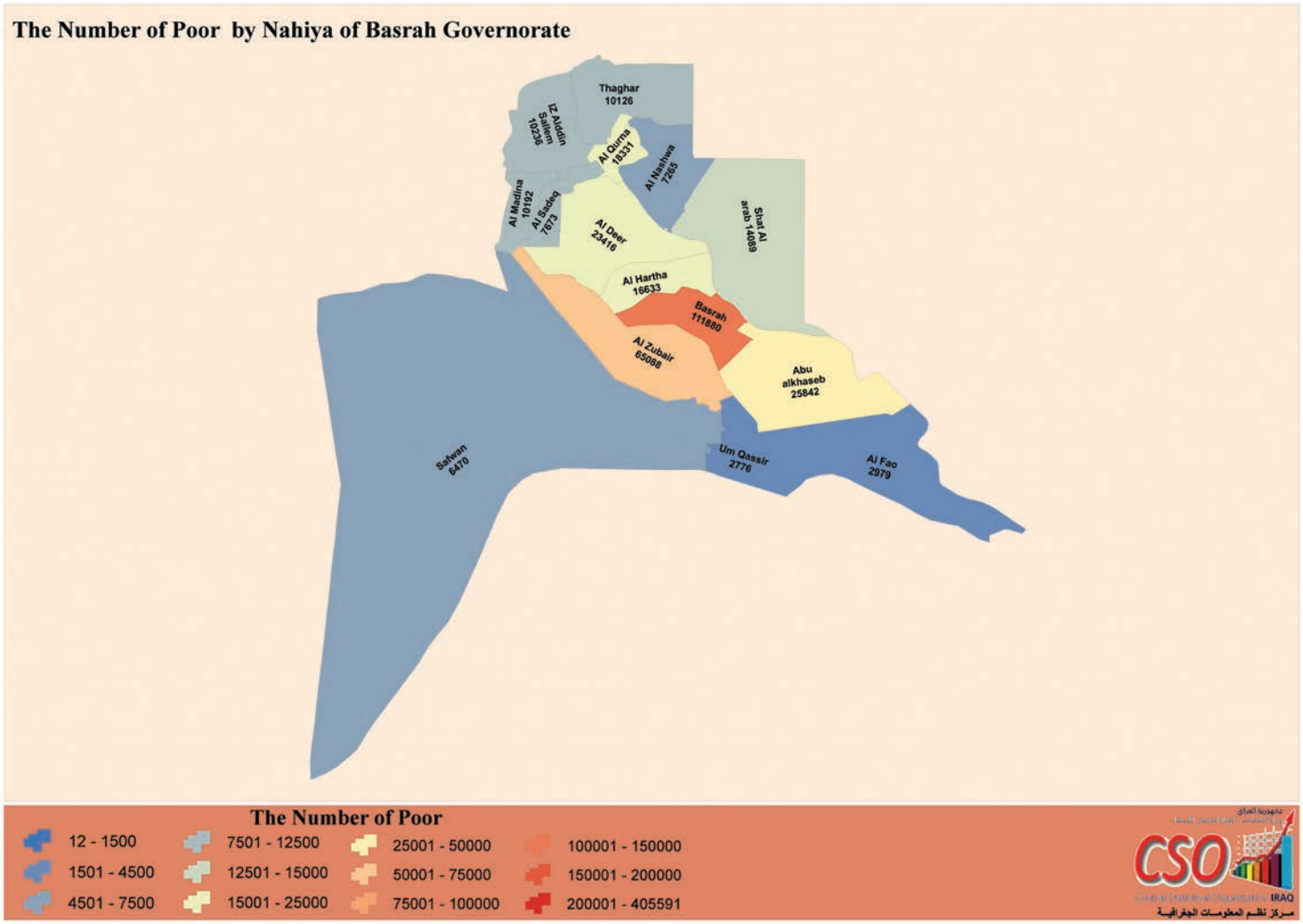
Basrah is Iraq's southernmost governorate, home to Iraq's only seaports, and borders Kuwait to the south and Iran to the east. Unlike the other southern governorates, Basra experienced significant improvements in welfare between 2007 and 2012. Um Qasr nahiya, which is also the location of Um Qasr port, Iraq's only deep water port, has poverty rates as low as 5 percent, and only 2800 poor persons. The three poorest nahiyas—al-Nashwa (25 percent), al-Dair (26 percent), and al-

FIGURE 34: Headcount rate – Basrah



Thagar (28 percent)—are all on the interior and border Iran. The largest number of poor people, almost 112,000 persons, live in the capital of the governorate, al-Basra qadha center which is also one of the largest cities in Iraq with a population of 1.2 million. The relative prosperity of Basrah is reflected in less than proportionate share of the poor; Basrah is home to 5.3 percent of the poor and 7.6 percent of Iraqis.

FIGURE 35: Number of poor – Basrah



10

Conclusion

Poverty map is a tool that combines the strengths of household budget survey and population and housing census to estimate poverty rate at small level of geographical disaggregation. Nationally representative budget surveys collect detailed information on household consumption which allows one to estimate poverty rate up to regional and rural/urban levels. On the other hand, census interviews all households but collects information on only a limited set of variables. Small area estimation entails estimating a relationship between household expenditure and observable household characteristics using the budget survey and imposing the relationship in the census to calculate predicted consumption—and poverty status—of each household. The information is then used to estimate average poverty rate at various levels of geographical aggregation. The exercise realizes its full potential when the estimated small area poverty rates are illustrated on a color-coded map. The visual representation of spatial distribution of poverty draws more attention and interest than presenting the information on a table ever could. It can galvanize political will and support for poverty reduction.

The discussion of poverty alleviation touches upon an important issue discussed earlier—the distinction between poor areas and areas where the poor live. Areas that have historically been left out of the mainstream development process exhibit entrenched and widespread poverty. However, areas with the highest poverty rate are not necessarily where most of the poor live because such areas are often sparsely populated. Urban centers and other populated areas might have low poverty rate but may host a large number of poor people due to their population size. The design and placement of programs and policies depend on whether the national priority is to target poor areas or poor people. To facilitate this discussion, the current exercise presents both poverty rate and number of poor at the nahiya level. As one can see from the maps, the areas with the highest poverty rate in Iraq are not always where most of the poor live. Indeed, there is no nahiya in common between ten poorest nahiyas and ten nahiyas with the most number of poor.

Beyond visual illustration of distribution of poverty, the map draws its power because of its usefulness to planners and policy makers. The most obvious use of poverty maps is for the targeting of antipoverty programs. Social protection programs often collect information on proxies of house-

hold welfare to identify poor households. This is to ensure that the funds reach the poorest and that there is minimal leakage to nonpoor and undercoverage of poor. Poverty ranking of small areas can be used to refine the targeting mechanism and improve its efficiency. Geographical targeting can be the "first stage" targeting where a program first identifies the areas with the highest poverty rate before collecting detailed information for household level targeting only in those areas. In areas with high poverty rate and low population density, small area estimation may obviate the need for household level targeting because identifying the poverty status of individual households may be extremely inefficient. Poverty ranking can also help in prioritization of placement and rollout of a program with limited budget; areas with the highest poverty rate can be the first to receive the program or the last to lose it.

The value of poverty map is further boosted when it is combined with other geocoded information like road, electricity, and irrigation networks, schools, health centers, and access to market. Superimposing auxiliary information on poverty map can shed light on the correlates of poverty. For instance, areas with high poverty rate may have poor supply of public services, weak infrastructure network, low access to markets and other opportunities for commerce and mobility. This lets policy makers deliver interventions tailored to fit local needs.

The general caution about correlation not being equal to causation is applicable here as well; while the maps show correlates of poverty, they do not identify its causes. For example, an area may be poor because it does not have extensive road network, but the direction of causality could run in the opposite direction: a poor area with weak tax base may not have the fiscal space to construct roads. The map is also not suited to analyze the impact of an intervention. Robust impact evaluations that provide credible answer to the counterfactual question "What would have been the impact in absence of the program?" need to be designed for the purpose. Again, this is outside the scope of small area estimation method.

Besides targeting and budget allocation, poverty maps have had a broader impact as well. By presenting disaggregated information on poverty in a highly accessible manner, the maps have fostered local debate on the determinants of poverty and consequences of policy. The objective poverty ranking of areas have provided countries the necessary empirical evidence to reform existing resource allocation mechanisms and placement of antipoverty programs. In countries where the maps are updated regularly, it has been possible to evaluate the changes in distribution of poverty over time. The maps have also served as focal instrument to coordinate the activities of multiple agencies. Please refer to Box 1 for international examples on the use of poverty maps.

It should be acknowledged that the numbers reported here are estimates derived from a modeling and imputation process. While great care has been taken to ensure that the estimates are as accurate as possible, including harmonization of survey questions and careful selection of explanatory variables, each prediction comes with a standard error. Therefore, the uncertainty associated with the estimates must be taken into consideration while interpreting the results.

One caveat does uniquely apply to the current work. The budget and household surveys are from 2012 and 2013 respectively, hence the picture presented here represents the state of Iraq as of 2013. The country has gone through many changes since then, and especially since summer of 2014, when Islamic State militants swept through a large swath of the country. This does not negate the value of the map because it still provides a valuable retrospective snapshot of the spatial distribution of poverty. If there is a correlation between violence and poverty and inequity, it sheds light on possible causes or consequences of violence to the extent violence restricts people's ability

BOX 1

International Experience on Uses of Poverty Maps

Poverty maps have been developed for at least 45 countries in the last fifteen years. Once a map has been developed for a country, it can be put to many uses as the following examples demonstrate.

Targeting

- **Bulgaria:** "In Bulgaria, poverty maps account for one of five formal criteria used in allocating social infrastructure projects among municipalities…The steering committee of the Social Investment Fund has found that the maps are important in the allocation process because they have helped guarantee an objective ranking among municipality applicants. Indeed, the committee has considered the maps so helpful that it has now integrated the small area poverty estimates into the fund's management information system."
- **Cambodia:** "In Cambodia, the World Food Programme has integrated several maps, including information on infrastructure and vulnerability to flood and drought, into a GIS, along with small area poverty and nutrition maps. It has used the combined information to identify potential areas for its programs. The maps have also been used for resource targeting by, for example, the Ministry of Agriculture, Forestry, and Fisheries.
- **Kenya:** "In Kenya, the allocation formula used in the Constituency Development Fund has been revised so that 25 percent of the allocations are based on the incidence of poverty, and those areas showing higher poverty incidence receive more resources from this portion of the allocations.

Identification of correlates of poverty

- **Sri Lanka:** "Overlaying the poverty map and a map depicting access to nearby markets or cities has demonstrated that poverty incidence is highly correlated with geographical isolation as measured by distance to the nearest market or city. This has prompted a shift to an emphasis on reaching areas that are more isolated. A similar exercise has been conducted with GIS data on drought patterns."

Validation of existing targeting mechanism

- **Morocco:** "In Morocco, an analysis of public expenditure and poverty has provided a measure of the extent to which program allocations have matched the patterns of poverty (the targeting differential approach). Morocco has found a strong correlation between poverty and other local data. This has enabled a deeper understanding of local conditions, the evolution of social conditions, and the effectiveness of government programs in reaching poor areas.

(*continued on next page*)

BOX 1

International Experience on Uses of Poverty Maps (*continued*)

- **Vietnam:** "The poverty map was overlaid with information on communes receiving funds through Program 135. The results of this exercise validated the program's targeting criteria by showing that most communes benefiting from Program 135 were in poor areas and that most poor areas were included in the program, although the analysis did reveal a few gaps in coverage in the Northwest region that needed attention.

Reform of existing programs

- **Sri Lanka:** "In Sri Lanka, the small area estimates on poverty at the Divisional Secretariat level were compared to the coverage of the Samurdhi transfer program, the largest welfare program in Sri Lanka. Only a weak correlation was found between the areas targeted by the program and the areas ranked as the poorest in the poverty map. This helped quantify the extent of mistargeting in the Samurdhi program with regard to both undercoverage and leakage. As a result, the formulas for the allocation of funds in the program were modified. This was very sensitive politically, as many people stood to receive reduced benefits or none at all because of the changes in the allocation criteria. As a compromise, allocations remained fairly constant for existing recipient areas, but the poorest of these areas saw an increase in funding."

Monitoring poverty over time

- **Ecuador:** "Ecuador was one of the first countries to construct a series (or panel) of poverty maps. It used data from 1990 and 2001, and the two maps helped identify areas where there had been a significant increase in poverty over that time (for example, urban areas in the Coast Region, where the 1990 poverty rates were lower), as well as areas where poverty had remained largely unchanged (such as rural areas in the Coast Region, where the 1990 poverty rates were higher)."

Inter-agency coordination

- **Mexico:** "…the president of Mexico has developed a plan to reduce poverty and promote human development by focusing on the 50 municipalities with the highest poverty rates and the lowest human development indexes. Seven ministries operating 12 different but related programs now focus as a priority on the poor in these 50 municipal areas. These seven ministries have had to coordinate the 12 programs to meet the targets set out in the plan. Previously, each ministry and program had its own priorities and objectives that were implemented in isolation.

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BOX 1

International Experience on Uses of Poverty Maps *(continued)*

- **South Africa:** "Data and maps on poverty, sanitation, clean water, and the incidence of cholera were used to help contain the spread of cholera in KwaZulu-Natal Province in South Africa in January 2001. Poverty and cholera data sets showed that the cholera outbreak had followed a river floodplain and was moving through poor areas toward other poor areas. The use of the data sets assisted in producing a swift, well-coordinated response by national and local government departments (health, water, and so on)..."

Sparking conversation on poverty

- **Morocco:** "Although there is less poverty in Morocco than in most countries in Africa, the poverty map in Morocco has highlighted the problem of persistent poverty and sparked a national conversation on poverty. King Mohammed VI has taken an especially keen interest, and the poverty maps have been used to help design and allocate the budget for his signature program, the National Human Development Initiative.
- **Vietnam:** "In Vietnam, poverty maps have revealed high levels of inequality both across and within regions. This strong message has resonated with many users and provided empirical evidence of patterns that were only suspected, but never documented.

Source: More than a Pretty Picture (Bedi, Coudouel, & Simler, 2007).

to move in search of opportunities, discourage investment, and hinder mutually beneficial transactions due to distrust in contract enforcement. The map is likely a more faithful representation of the current situation in the Southern governorates because they have been relatively insulated from the recent spate of violence that has convulsed the rest of the country.

It also points to the need for collecting detailed data at high frequency to be able to understand the changing circumstances and respond to it appropriately. For best effect, the map must be updated frequently so that there is timely information on the trends of poverty and other socioeconomic indicators. New technology like mobile phone surveys and computer assisted telephone interview (CAPI) can be used to reduce security risk and overcome logistical challenges associated with frequent surveys.

The Government of Iraq's effort to measure poverty and understand its causes through regular household expenditure surveys and comprehensive poverty assessment reports is highly commendable. It is also committed to understanding the changing poverty landscape by conducting expenditure surveys at high frequency and using advanced imputation methods to estimate poverty. This will help the government be prepared and devise appropriate response in crisis and emergency situations.

11

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12

Appendices

Appendix A: Headcount Rate and Number of Poor (by Nahiya)

TABLE A1: Duhouk

Nahiya	Population	Headcount rate	Std. Err.	[95% Conf. Interval]		Number of poor
Duhouk Qadha Center	299220	0.04	0.02	0.00	0.07	10622
Zawita Nahia	18040	0.03	0.02	0.00	0.08	621
Mankishki Nahia	11669	0.05	0.03	0.00	0.11	607
Sumeil Qadha Center	72531	0.04	0.02	0.00	0.08	2938
Bateel Nahia	22113	0.12	0.04	0.03	0.20	2558
Zakhow Qadha Center	192126	0.06	0.03	0.01	0.11	11566
Rizgary Nahia	21072	0.09	0.04	0.00	0.17	1856
Darkar (AL Syndi) Nahia	16929	0.07	0.03	0.00	0.14	1227
Batifa Nahia	22876	0.07	0.03	0.00	0.13	1533
Al-Amadia Qadha Center	9306	0.03	0.02	0.00	0.07	263
Sarsank Nahia	21785	0.03	0.02	0.00	0.07	741
Kani Massi Nahia	12658	0.05	0.03	0.00	0.12	676
Dirluk Nahia	53465	0.06	0.03	0.00	0.12	3106
Jamanki Nahia	4846	0.04	0.03	0.00	0.10	203
Bamerli Nahia	7459	0.05	0.03	0.00	0.12	374
Qasrouk Nahia	67510	0.10	0.04	0.02	0.18	6683
Atreesh Nahia	12906	0.06	0.04	0.00	0.14	820
Baotheri Nahia	13344	0.09	0.04	0.01	0.17	1182
Akry Qadha Center	64505	0.05	0.02	0.00	0.09	2922
Dinarta Nahia	22972	0.08	0.04	0.00	0.17	1881

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TABLE A1: Duhouk *(continued)*

Nahiya	Population	Headcount rate	Std. Err.	[95% Conf. Interval]		Number of poor
Bijeel Nahia	16681	0.09	0.05	0.00	0.18	1458
Kurdseen Nahia	40772	0.09	0.03	0.03	0.16	3808
Bardarash Qadha Center	26359	0.05	0.03	0.00	0.11	1381
Darto Nahia	30074	0.10	0.04	0.02	0.18	2938
Rofia Nahia	31480	0.09	0.04	0.02	0.16	2843
kalak Nahia	29623	0.10	0.04	0.01	0.19	2915

TABLE A2: Nineveh

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Mosal Qadha Center	1289229	0.31	0.07	0.17	0.46	405591
Bashiqa Nahia	110189	0.43	0.07	0.29	0.58	47602
Al-Shoura Nahia	58213	0.48	0.07	0.34	0.62	28082
Hammam Al-Alil	73064	0.42	0.07	0.29	0.56	30884
Al-Qayarra Nahia	127842	0.48	0.06	0.36	0.60	61108
Al-Mahalabia Nahia	34401	0.49	0.07	0.35	0.63	16912
Al-Hamdania Qadha Center	87698	0.20	0.05	0.10	0.29	17162
Namroiud Nahia	62616	0.32	0.07	0.18	0.47	20150
Bartilla Nahia	67056	0.39	0.07	0.25	0.53	26172
Tilkaif Qadha Center	83858	0.27	0.06	0.16	0.39	22935
Wana Nahia	49132	0.26	0.05	0.16	0.37	12976
Alkoush Nahia	63086	0.40	0.06	0.27	0.53	25487
Sinjar Qadha Center	75760	0.37	0.07	0.23	0.51	27986
Al-Shamal Nahia	141128	0.62	0.06	0.49	0.75	87852
Al-Qairawan Nahia	62793	0.58	0.06	0.46	0.70	36527
Telafar Qadha Center	193602	0.49	0.08	0.32	0.66	95078

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TABLE A2: Nineveh *(continued)*

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Zummar Nahia	135063	0.50	0.07	0.36	0.64	67788
Rabia Nahia	77796	0.50	0.08	0.35	0.66	39077
Al-Ayadiya Nahia	52393	0.51	0.07	0.37	0.65	26841
Al-Shaikhan Qadha Center	24777	0.13	0.04	0.04	0.22	3209
Zaylakan Nahia	16021	0.28	0.07	0.13	0.43	4467
Al-Hatra Qadha Center	18306	0.31	0.07	0.16	0.45	5594
Al-Tal Nahia	32204	0.40	0.08	0.24	0.56	12856
Al-Baaj Qadha Center	59136	0.64	0.07	0.50	0.77	37817
Al-Qahtanya Nahia	70626	0.60	0.08	0.44	0.76	42708
Makhmoor Qadha Center	46387	0.17	0.05	0.06	0.27	7714
Al-Kuwair Nahia	71330	0.22	0.06	0.11	0.33	15878
Kandinawa Nahia	17584	0.08	0.04	0.00	0.16	1408
Qaraj Nahia	33540	0.33	0.07	0.19	0.46	10911
Mula-Qara Nahia	23818	0.23	0.07	0.10	0.36	5473
Faidah Nahia	75937	0.15	0.05	0.05	0.26	11618

TABLE A3: Erbil

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Arbil Qadha Center	730106	0.03	0.02	0.00	0.07	19786
Bahraka Nahia	48502	0.04	0.02	0.00	0.08	1809
Ainkawa Nahia	25134	0.01	0.01	0.00	0.02	133
Shamamak Nahia	52607	0.07	0.03	0.00	0.13	3593
Dashti Hawler Qadha Center	49736	0.04	0.03	0.00	0.09	1925
Darroo Nahia	52723	0.05	0.04	0.00	0.11	2409
Qoshtaba Nahia	27918	0.07	0.04	0.00	0.15	1854
Kasnasan Nahia	60455	0.05	0.04	0.00	0.13	3156
Sowran Qadha Center	48970	0.04	0.03	0.00	0.10	1915
Khalifan Nahia	33735	0.08	0.04	0.00	0.16	2776
Diyana Nahia	58559	0.05	0.03	0.00	0.10	2998
Siakan Nahia	13094	0.11	0.06	0.00	0.23	1438
Shaqlawa Qadha Center	21205	0.03	0.02	0.00	0.07	568
Salah-eldeen Nahia	47309	0.04	0.02	0.00	0.08	1698
Harir Nahia	32861	0.06	0.03	0.00	0.12	1896
Hyran Nahia	4688	0.05	0.04	0.00	0.12	238
Bamarsa Nahia	17813	0.08	0.05	0.00	0.18	1495
Balisan Nahia	4534	0.08	0.05	0.00	0.19	372
Choman Qadha Center	10457	0.03	0.03	0.00	0.09	365
Haj Omran Nahia	3401	0.06	0.04	0.00	0.13	196
Samilan Nahia	4669	0.07	0.05	0.00	0.16	344
Galala Nahia	1772	0.05	0.04	0.00	0.13	93

(*continued on next page*)

TABLE A3: Erbil *(continued)*

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Qasry Nahia	5669	0.05	0.04	0.00	0.12	262
Kuwaisinjaq Qadha Center	56966	0.02	0.02	0.00	0.06	1396
Taq-Taq Nahia	22993	0.06	0.04	0.00	0.14	1423
Shorash Nahia	5947	0.11	0.06	0.00	0.23	635
Ashty Nahia	4199	0.08	0.05	0.00	0.19	354
Saktan Nahia	2371	0.07	0.05	0.00	0.17	164
Sikerdkan Nahia	3401	0.11	0.06	0.00	0.23	367
Meirkasoor Qadha Center	1394	0.04	0.04	0.00	0.11	57
Barazan Nahia	21484	0.05	0.03	0.00	0.11	1100
Biran Nahia	6523	0.06	0.04	0.00	0.13	372
Sherwan Mazin Nahia	3616	0.03	0.03	0.00	0.09	114
Mazni Nahia	5571	0.07	0.04	0.00	0.15	402
Koratoo Nahia	9713	0.03	0.02	0.00	0.08	301
Khabat Qadha Center	38333	0.08	0.05	0.00	0.18	2948
Darashakran Nahia	8446	0.07	0.04	0.00	0.14	609
Rizkari Nahia	35460	0.07	0.04	0.00	0.15	2408
Korakosak Nahia	16358	0.06	0.04	0.00	0.14	1009
Rawandoz Qadha Center	17994	0.05	0.03	0.00	0.10	826
Warny Nahia	5100	0.06	0.04	0.00	0.14	315

TABLE A4: Sulaimaniya

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Sulaimania Qadha Center	598051	0.00	0.00	0.00	0.01	2930
Bakrago Nahia	89179	0.01	0.01	0.00	0.02	847
Bazyan Nahia	36939	0.02	0.02	0.00	0.05	628
Tanjro Nahia	43289	0.02	0.02	0.00	0.06	1043
Qaradagh Qadha Center	7294	0.01	0.01	0.00	0.04	93
Siasitan Nahia	2170	0.01	0.01	0.00	0.04	27
Sharazoor Qadha Center	38712	0.01	0.01	0.00	0.04	538
Warma Nahia	26153	0.02	0.01	0.00	0.04	408
Said Sadiq Qadha Center	72903	0.02	0.02	0.00	0.05	1546
Sarjook Nahia	3676	0.04	0.03	0.00	0.10	161
Halabja Qadha Center	59871	0.00	0.00	0.00	0.01	204
Sirwan Nahia	12329	0.01	0.01	0.00	0.03	129
Khormal Nahia	19787	0.01	0.01	0.00	0.03	186
Biara Nahia	6831	0.00	0.01	0.00	0.02	27
Benjween Qadha Center	25336	0.02	0.01	0.00	0.04	400
Karmak Nahia	10813	0.06	0.04	0.00	0.14	650
Talbraiz Nahia	5989	0.07	0.05	0.00	0.17	418
Jowarta Nahia	8051	0.01	0.01	0.00	0.03	97
Sioutil Nahia	2243	0.01	0.01	0.00	0.04	26
Sitek Nahia	5015	0.02	0.02	0.00	0.05	98
Zalan Nahia	1539	0.02	0.02	0.00	0.06	36
Kabiloon Nahia	3328	0.03	0.03	0.00	0.08	107

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TABLE A4: Sulaimaniya *(continued)*

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Mout Qadha Center	9230	0.02	0.02	0.00	0.06	186
Qalat-Diza Nahia	67252	0.01	0.01	0.00	0.04	888
Hero Nahia	1833	0.03	0.03	0.00	0.08	47
Halashow Nahia	8488	0.04	0.04	0.00	0.11	334
Tharaow Nahia	12350	0.03	0.02	0.00	0.07	326
Nawadesht Nahia	22015	0.04	0.03	0.00	0.10	896
Eisiway Nahia	2707	0.03	0.03	0.00	0.09	71
Ranya Qadha Center	83175	0.02	0.01	0.00	0.04	1289
Jwar Qorna Nahia	49135	0.02	0.01	0.00	0.04	875
Haji Awa Nahia	55781	0.02	0.02	0.00	0.05	1261
Betwata Nahia	17729	0.03	0.02	0.00	0.08	587
Serkabkan Nahia	7470	0.02	0.02	0.00	0.06	167
Dukan Qadha Center	12308	0.01	0.01	0.00	0.02	94
Sordash Nahia	5291	0.03	0.02	0.00	0.08	156
Bira Magroon Nahia	30431	0.02	0.02	0.00	0.05	630
Khalakan Nahia	4985	0.02	0.01	0.00	0.05	95
Khadran Nahia	2962	0.05	0.03	0.00	0.12	161
Bengrad Nahia	7402	0.05	0.03	0.00	0.10	335
Derbendikhan Qadha Center	42533	0.01	0.01	0.00	0.02	276
Bawkhosheen Nahia	1116	0.01	0.01	0.00	0.04	12
Kalar Qadha Center	131823	0.01	0.01	0.00	0.02	936
Rizgary Nahia	37248	0.02	0.01	0.00	0.04	570

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TABLE A4: Sulaimaniya *(continued)*

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Bibaz Nahia	7234	0.01	0.01	0.00	0.03	95
Shaikh Taweel Nahia	2520	0.05	0.04	0.00	0.12	128
Kifry Qadha Center	33236	0.01	0.01	0.00	0.04	469
Awaseby Nahia	968	0.15	0.07	0.00	0.29	142
Serqalat Nahia	7979	0.04	0.03	0.00	0.09	299
Neowjool Nahia	1993	0.07	0.04	0.00	0.16	142
Kokas Nahia	7801	0.10	0.04	0.02	0.18	786
Chamchamal Qadha Center	60753	0.01	0.01	0.00	0.03	711
Shorash Nahia	49702	0.02	0.01	0.00	0.05	910
Sangaw Nahia	5680	0.09	0.04	0.00	0.17	490
Takiya Nahia	26767	0.03	0.02	0.00	0.07	822
Aghcheler Nahia	9015	0.05	0.03	0.00	0.12	469
Qader Karam Nahia	2403	0.08	0.04	0.00	0.16	198
Takiya Jabara Nahia	893	0.04	0.04	0.00	0.11	37
Khanaqeen Qadha Center	6654	0.03	0.02	0.00	0.06	172
Bamow Nahia	909	0.03	0.03	0.00	0.10	30
Qoratoo Nahia	6085	0.05	0.03	0.00	0.11	297

TABLE A5: Diyala

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Baquba Qadha Center	259528	0.15	0.06	0.01	0.28	37683
Kanan Nahia	42543	0.22	0.08	0.05	0.38	9168
Beni Saad Nahia	130545	0.29	0.09	0.11	0.46	37754
Buhruz (Ashnouna) Nahia	46926	0.17	0.07	0.04	0.30	8071
Al-Abara Nahia	67101	0.20	0.07	0.06	0.35	13642
Al-Muqdadya Qadha Center	148794	0.23	0.08	0.07	0.39	34327
Abi Seda Nahia	38845	0.17	0.07	0.03	0.32	6732
Al-Wajihia Nahia	37260	0.24	0.08	0.06	0.40	8764
Al-Khalis Qadha Center	126554	0.20	0.08	0.02	0.38	25577
Al-Mansuriya Nahia	54557	0.30	0.09	0.11	0.49	16503
Hibhib Nahia	86691	0.18	0.08	0.03	0.34	15977
Al-Sad Al-Adim Nahia	18385	0.29	0.10	0.07	0.49	5240
Al-Salam Nahia	23090	0.22	0.08	0.06	0.37	5057
Khanaqin Qadha Center	82949	0.10	0.05	0.01	0.19	8461
Jalawla Nahia	83675	0.24	0.09	0.05	0.41	19722
Al-Saadiya Nahia	47213	0.24	0.08	0.08	0.40	11454
Baladrooz Qadha Center	89294	0.23	0.08	0.08	0.39	20707
Mendili Nahia	33246	0.32	0.10	0.12	0.52	10788
Qazania Nahia	14541	0.27	0.08	0.10	0.43	3932
Qarataba Nahia	28922	0.17	0.07	0.04	0.30	4943
Jabbara Nahia	7585	0.18	0.07	0.02	0.32	1333

TABLE A6: Kirkuk

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Kirkuk Qadha Center	886618	0.05	0.01	0.03	0.08	47877
Yaychi Nahia	25903	0.10	0.03	0.04	0.17	2684
Alton Kupry	38224	0.02	0.01	0.00	0.04	849
Al-Multaka (Mula Abdullah) Nahia	15271	0.19	0.04	0.10	0.27	2866
Taza Khormato Nahia	32208	0.11	0.03	0.05	0.17	3485
Laylan Nahia	19802	0.09	0.03	0.02	0.15	1711
Shwan Nahia	11296	0.05	0.02	0.01	0.10	604
Qara Hanjeer (Al-Rabee) Nahia	10949	0.05	0.02	0.01	0.10	558
Al-Hawiga Qadha Center	95854	0.13	0.03	0.07	0.18	12020
Al-Abbasi Nahia	49339	0.23	0.05	0.14	0.33	11560
Al-Riyadh Nahia	44931	0.25	0.05	0.15	0.34	11022
Al-Zab Nahia	52758	0.16	0.04	0.09	0.23	8383
Daquq Qadha Center	54860	0.15	0.03	0.08	0.21	8229
Al-Rashad Nahia	23204	0.27	0.05	0.17	0.36	6163
Dibis Qadha Center	45048	0.13	0.03	0.07	0.19	5888
Sarkran (Al-Qudis) Nahia	18037	0.10	0.03	0.04	0.15	1719

TABLE A7: Anbar

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Ramadi Qadha Center	368374	0.15	0.05	0.05	0.25	54556
Al-Habbaniya Nahia	136466	0.16	0.05	0.06	0.26	21589
Al-waffa Nahia	9749	0.48	0.10	0.27	0.69	4702
Heet Qadha Center	80563	0.17	0.05	0.07	0.26	13663
Baghdady Nahia	28616	0.12	0.05	0.02	0.23	3497
Kubaisa Nahia	14632	0.14	0.05	0.05	0.23	2035
Al-Forat Nahia	24713	0.28	0.07	0.13	0.42	6937
Al-Falluja Qadha Center	293877	0.17	0.05	0.08	0.26	49107
Al-Amirya Nahia	78756	0.13	0.05	0.04	0.23	10412
Al-Saklawiya Nahia	49361	0.19	0.07	0.06	0.32	9522
Al-Garma Nahia	139664	0.46	0.12	0.21	0.70	63757
Ana Qadha Center	31336	0.08	0.03	0.02	0.14	2479
Haditha Qadha Center	50095	0.11	0.04	0.03	0.19	5606
Al-Haqlaniya Nahia	29185	0.09	0.03	0.03	0.15	2542
Barwana Nahia	27838	0.13	0.04	0.05	0.20	3491
Al-Rutba Qadha Center	32035	0.25	0.06	0.13	0.35	7858
Al-Walid Nahia	6221	0.09	0.04	0.01	0.18	577
Al-Nakhaeb Nahia	2975	0.18	0.05	0.07	0.29	539
Al-Kaim Qadha Center	95636	0.22	0.05	0.11	0.32	20830
Al-Obour Nahia	36089	0.28	0.08	0.13	0.44	10260
Al-Obiadi Nahia	29511	0.08	0.04	0.01	0.16	2500
Rawa Qadha Center	23083	0.06	0.02	0.01	0.10	1304

TABLE A8: Salahadin

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Tikrit Qadha Center	167383	0.15	0.05	15.68	0.15	24940
Alam Nahia	52988	0.15	0.05	16.16	0.15	7911
Tooz-Khormato Qadha Center	108301	0.13	0.05	14.47	0.13	13538
Amerly Nahia	42913	0.20	0.07	13.92	0.20	8793
Sulaiman Baig Nahia	24751	0.21	0.08	14.35	0.21	5091
Samarra Qadha Center	182139	0.14	0.05	16.43	0.14	25427
Al-Muotasim Nahia	16438	0.18	0.07	14.20	0.18	2919
Dijla Nahia	16076	0.20	0.07	14.03	0.20	3199
Balad Qadha Center	73122	0.14	0.05	16.75	0.14	10237
Al-Dholoia Nahia	57863	0.18	0.06	14.09	0.18	10583
Al-Eshaki Nahia	41193	0.21	0.06	12.08	0.21	8457
Yathrib Nahia	73627	0.20	0.06	13.36	0.20	14512
Beygee Qadha Center	170961	0.17	0.06	15.78	0.17	29354
Al-Ssynia Nahia	35680	0.17	0.06	16.70	0.17	5962
Al-Daur Qadha Center	56181	0.09	0.04	19.36	0.09	5112
Al-Shirqat Qadha Center	199567	0.18	0.06	15.29	0.18	35164
Al-Dijail Qadha Center	106129	0.20	0.05	14.29	0.20	21194

TABLE A9: Baghdad

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Rusafa Qadha Center	114797	0.04	0.01	0.01	0.06	4328
Al-Karrada Al-Sharqia Nahia	311485	0.03	0.01	0.01	0.04	7818
Baghdad Al-Jedeeda Nahia	1140276	0.11	0.02	0.07	0.15	126000
Palestine Nahia	84777	0.00	0.00	0.00	0.01	322
Al-Adhamia Qadha Center	299280	0.02	0.01	0.01	0.03	6464
Al-Rashdia Nahia	41847	0.16	0.02	0.11	0.21	6733
Al-Fahama Nahia	614606	0.12	0.02	0.08	0.16	73568
Al-Zohour Nahia	198287	0.24	0.04	0.17	0.31	47728
Sader /2 Qadha Center	39683	0.08	0.02	0.04	0.12	3060
Abna'a Al-Rafidain Nahia	140824	0.13	0.02	0.08	0.17	17913
Al-Mounawara Nahia	262843	0.18	0.03	0.13	0.23	48100
Sader /1 Qadha Center	107069	0.11	0.02	0.07	0.15	11446
Al-Sideeq Al-Akbar Nahia	139347	0.12	0.02	0.07	0.16	16039
Al-Forat Nahia	295399	0.08	0.02	0.05	0.11	23868
Al-Karkh Qadha Center	99483	0.02	0.01	0.01	0.03	2020
Al-Mansour Nahia	441714	0.02	0.01	0.01	0.04	10071
Al-Mamoon Nahia	856502	0.03	0.01	0.01	0.05	26295
Al-Kadimiya Qadha Center	380306	0.05	0.01	0.02	0.07	18103
That Al Salasil Nahia	249432	0.13	0.02	0.09	0.17	31753
Al-Taji Nahia	157441	0.22	0.03	0.16	0.27	34149
Mahmudiya Qadha Center	132673	0.11	0.02	0.07	0.14	14024
Al-Yousifya Nahia	128003	0.30	0.03	0.23	0.36	37914

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TABLE A9: Baghdad *(continued)*

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Latifya Nahia	90228	0.18	0.03	0.13	0.23	16142
Al-Rasheed Nahia	70755	0.18	0.03	0.13	0.23	12863
Abu-Gharib Qadha Center	149233	0.17	0.03	0.12	0.22	24758
Al-Nasir & Al-Salam Nahia	150969	0.27	0.04	0.20	0.35	41335
Al-Tarmiya Qadha Center	74957	0.19	0.03	0.14	0.25	14444
Al-Mishahda Nahia	24696	0.49	0.05	0.39	0.60	12212
Al-Abiaji Nahia	13542	0.11	0.02	0.06	0.15	1430
Al-Mada'in Qadha Center	60739	0.07	0.02	0.03	0.11	4300
Al-Jisr Nahia	154422	0.18	0.03	0.12	0.24	27286
Al-Wihda Nahia	217970	0.27	0.04	0.19	0.35	58634

TABLE A10: Babylon

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Hilla Qadha Center	540313	0.06	0.02	0.02	0.10	34688
Al-Kifl Nahia	143532	0.20	0.05	0.10	0.29	28333
Abi Gharaq Nahia	107182	0.12	0.03	0.05	0.19	12551
Al-Mahawil Qadha Center	97792	0.09	0.03	0.03	0.15	9124
Al-Mashroo Nahia	107289	0.19	0.04	0.11	0.27	20771
Al-Emam Nahia	31725	0.11	0.04	0.04	0.19	3604
Nile Nahia	55976	0.19	0.05	0.09	0.29	10742
Al-Hashimiya Qadha Center	34816	0.08	0.03	0.01	0.15	2803
Al-Qasim Nahia	154236	0.16	0.04	0.07	0.25	24878
Al-Madhatiya Nahia	123158	0.16	0.04	0.07	0.25	19989
Al-Shomaly Nahia	77233	0.21	0.05	0.11	0.30	15972
Al-Talea'a Nahia	39739	0.24	0.06	0.11	0.35	9430
Al-Mussyab Qadha Center	51656	0.07	0.03	0.01	0.12	3497
Saddat Al-Hindin Nahia	98499	0.10	0.03	0.04	0.17	10333
Jurf Al-Sakhar Nahia	40310	0.11	0.04	0.03	0.18	4249
Al-Iskandaria Nahia	148019	0.10	0.03	0.03	0.17	14624

TABLE A11: Kerbala

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Kerbela Qadha Center	478879	0.12	0.03	0.07	0.17	55789
Al-Hassainya Nahia	138949	0.09	0.02	0.04	0.13	12005
Al-Hur Nahia	211975	0.20	0.04	0.13	0.27	41929
Ain Al-Tamur Qadha Center	26924	0.13	0.04	0.06	0.21	3592
Al-Hindiya Qadha Center	106961	0.10	0.02	0.05	0.15	10557
Al-Jadwal Al-Ghrabi Nahia	75029	0.18	0.04	0.11	0.25	13565
Al-Kharirat Nahia	50715	0.16	0.04	0.09	0.23	8099

TABLE A12: Wasit

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Kut Qadha Center	407511	0.26	0.06	0.15	0.38	107746
Wasit Nahia	39912	0.43	0.08	0.27	0.58	17050
Shaekh Saad Nahia	37237	0.48	0.08	0.33	0.63	17855
Al-Noamaniya Qadha Center	99503	0.18	0.05	0.08	0.28	17682
Al-Ahrar Nahia	45482	0.23	0.06	0.11	0.36	10661
Al-Hai Qadha Center	86108	0.14	0.03	0.07	0.21	12313
Al-Mowafaqiya Nahia	45903	0.32	0.05	0.22	0.43	14836
Al-Bashaer Nahia	36733	0.35	0.06	0.23	0.47	12930
Badra Qadha Center	17372	0.27	0.06	0.14	0.39	4635
Jassan Nahia	10741	0.33	0.07	0.19	0.48	3583
Al-Tahab Nahia (Zerbattiya)	684	0.22	0.09	0.03	0.40	148
Al-Suwaira Qadha Center	136628	0.14	0.04	0.07	0.22	19592
Al-Zubaidiya Nahia	53975	0.16	0.04	0.08	0.25	8803
Al-Shehamiya Nahia	34095	0.22	0.06	0.11	0.33	7532
Al-Aziziya Qadha Center	93164	0.24	0.06	0.12	0.35	22071
Taj-eldeen (AlHafriya) Nahia	75204	0.28	0.07	0.15	0.41	21065
Al-Duboni Nahia	18118	0.37	0.08	0.22	0.52	6747

TABLE A13: Najaf

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Najaf Qadha Center	688448	0.06	0.02	0.03	0.09	43166
Al-Haydariya Nahia	45096	0.19	0.03	0.12	0.26	8699
Al-Shabaka Nahia	356	0.16	0.07	0.01	0.31	57
Al-Kufa Qadha Center	217736	0.07	0.02	0.04	0.11	16200
Al-Abbassiya Nahia	84544	0.10	0.03	0.04	0.15	8125
Al-Huriya Nahia	29087	0.13	0.03	0.07	0.19	3912
Al-Manathera Qadha Center	82451	0.13	0.03	0.08	0.18	10677
Al-Heera Nahia	35223	0.12	0.03	0.06	0.18	4114
Al-Mishkhab Nahia	83299	0.12	0.03	0.07	0.17	9879
Al-Qadisiya Nahia	47066	0.21	0.04	0.12	0.28	9766

TABLE A14: Qadisiya

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Diwaniya Qadha Center	388415	0.27	0.04	0.20	0.35	105998
Al-Saniya Nahia	44312	0.36	0.05	0.25	0.46	15775
Al-Shafeia Nahia	44034	0.35	0.05	0.25	0.44	15227
Al-Daghara Nahia	58930	0.44	0.06	0.33	0.55	26023
Afaq Qadha Center	52169	0.56	0.05	0.45	0.66	29136
Nafar Nahia	19527	0.44	0.06	0.32	0.56	8584
Al-Badair Nahia	60219	0.65	0.05	0.54	0.75	38974
Sumer Nahia	32587	0.34	0.06	0.22	0.45	10936
Al-Shamiya Qadha Center	94112	0.51	0.05	0.42	0.60	48176
Gammas Nahia	87526	0.77	0.04	0.68	0.83	67351
Al-Mihanawiya Nahia	42255	0.45	0.06	0.34	0.57	19222
Al-Salahiya Nahia	31130	0.61	0.06	0.48	0.73	18834
Al-Hamza Qadha Center	112885	0.56	0.05	0.46	0.67	63385
Al-Sadeer Nahia	40584	0.57	0.05	0.47	0.67	23222
Al-Shinafiya Nahia	49401	0.57	0.06	0.45	0.68	28109

TABLE A15: Muthanna

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Samawa Qadha Center	271285	0.41	0.10	0.19	0.62	111254
Al-Sowair Nahia	39066	0.70	0.09	0.51	0.87	27428
Al-Rumaitha Qadha Center	118423	0.49	0.12	0.23	0.74	57909
Al-Majd Nahia	37727	0.66	0.09	0.46	0.84	24855
Al-Warka Nahia	93216	0.71	0.09	0.52	0.88	65988
Al-Najmi Nahia	32461	0.72	0.08	0.54	0.88	23453
Al-Hilal Nahia	31800	0.73	0.08	0.55	0.88	23255
Al-Salman Qadha Center	7818	0.58	0.12	0.34	0.80	4506
Al-Bussaiya Nahia	927	0.57	0.12	0.32	0.80	527
Al-Khdhir Qadha Center	77965	0.58	0.11	0.35	0.79	44908
Al-Daraji Nahia	18258	0.70	0.09	0.51	0.86	12740

TABLE A16: Thi Qar

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Nasiriya Qadha Center	498661	0.23	0.04	0.14	0.32	115141
Al-Islah Nahia	40695	0.37	0.06	0.25	0.49	15110
Al-Battha'a Nahia	40259	0.35	0.06	0.23	0.48	14252
Said Dekhil Nahia	55881	0.63	0.05	0.53	0.72	35172
Ur Nahia	58637	0.41	0.07	0.27	0.54	23848
Al-Rifaai Qadha Center	130791	0.38	0.06	0.27	0.49	49596
Qalat Siker Nahia	100416	0.46	0.06	0.34	0.58	46623
Al-Nasr Nahia	84910	0.37	0.06	0.25	0.48	31289
Al-Fajer Nahia	55939	0.46	0.06	0.34	0.58	25877
Suq AL-Shoyolh Qadha Center	117837	0.32	0.06	0.21	0.43	37684
Akaika Nahia	45459	0.49	0.07	0.35	0.62	22061
Garmat Beni Said Nahia	57436	0.42	0.07	0.29	0.55	24066
Al-Fadhliya Nahia	53086	0.33	0.06	0.20	0.45	17370
Al-Ttar Nahia	18161	0.49	0.08	0.33	0.64	8830
Al-Chibayish Qadha Center	41831	0.53	0.06	0.41	0.64	22175
Al-Hammer Nahia	8521	0.55	0.06	0.43	0.67	4726
Al-Fhood Nahia	44075	0.48	0.06	0.35	0.61	21182
Al-Shattra Qadha Center	227380	0.37	0.06	0.25	0.49	84631
Al-Dawaya Nahia	77893	0.62	0.05	0.51	0.71	48216
Al-Gharraf Nahia	111957	0.48	0.07	0.34	0.62	54064

TABLE A17: Missan

Qhada	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Amara Qadha Center	529251	0.25	0.08	0.09	0.41	131625
Kumait Nahia	26709	0.44	0.10	0.23	0.64	11755
Ali Al-Garbi Qadha Center	31250	0.30	0.10	0.11	0.50	9481
Ali Al-Sharqi Nahia	17859	0.21	0.09	0.02	0.40	3727
Al-Maimouna Qadha Center	52379	0.48	0.07	0.33	0.62	24896
Al-Salam Nahia	35140	0.66	0.06	0.54	0.76	23217
Said Ahmed Al-Rifaai Nahia	10450	0.67	0.08	0.50	0.82	6968
Qalat Saleh Qadha Center	53955	0.68	0.06	0.55	0.77	36808
Al-Ezair Nahia	29933	0.70	0.05	0.58	0.79	20875
Al-Mejar Al-Kabir Qadha Center	84476	0.38	0.07	0.24	0.52	32067
Al-Adel Nahia	15243	0.25	0.08	0.10	0.40	3838
Al-Khayr Nahia	19585	0.64	0.07	0.49	0.76	12446
Al-Kahla'a Qadha Center	37435	0.44	0.07	0.30	0.58	16412
Al-Mshsrsh Nahia	30369	0.47	0.07	0.33	0.60	14176
Bani Hashim Nahia	20003	0.72	0.06	0.60	0.83	14498

TABLE A18: Basrah

Nahiya	Population	Headcount rate	Std. Err.	[95% Confidence Interval]		Number of poor
Al-Basrah Qadha Center	1172742	0.10	0.02	0.06	0.13	111880
Al-Hartha Nahia	140123	0.12	0.02	0.07	0.16	16633
Abu Al-Khaseeb Qadha Center	190855	0.14	0.02	0.09	0.18	25842
Al-Zubair Qadha Center	353932	0.18	0.02	0.14	0.23	65088
Safwan Nahia	36065	0.18	0.03	0.12	0.24	6470
Um Qasr Nahia	51314	0.05	0.02	0.02	0.09	2776
Al-Qurna Qadha Center	119267	0.15	0.03	0.10	0.20	18331
Al-Dair Nahia	90761	0.26	0.03	0.19	0.32	23416
Al-Thagar Nahia	35542	0.28	0.05	0.19	0.37	10126
Al-Faw Qadha Center	34766	0.09	0.02	0.04	0.13	2979
Shat Al-Arab Qadha Center	123049	0.11	0.02	0.07	0.16	14089
Al-Nashwa Nahia	29167	0.25	0.04	0.17	0.33	7265
Al-Midaina Qadha Center	68677	0.15	0.03	0.10	0.20	10192
Iz-Eldeen Salim Nahia	60926	0.17	0.03	0.10	0.23	10236
Talha (Al-Sadiq) Nahia	66836	0.11	0.03	0.06	0.17	7673

Appendix B: GLS Models

Duhok	Coefficient	Std. Err.	t	|Prob|>t
Intercept	5.4114	0.0402	134.6406	0
Dummy variable for ownership of air conditioner	0.1433	0.0247	5.8052	0
Dummy variable for age 30–39	0.0624	0.0263	2.3736	0.0178
Dummy variable for age 50–59	–0.0784	0.03	–2.6111	0.0091
Number of children between ages 7 and 17	–0.1061	0.0087	–12.1801	0
Dependency ratio	–0.2417	0.0892	–2.7079	0.0069
Dummy variable for primary level complete	0.0599	0.0267	2.2462	0.0249
Dummy variable for secondary level incomplete or complete	0.1985	0.0761	2.6095	0.0092
Dummy variable for institute level complete	0.151	0.0479	3.1534	0.0017
Dummy variable for graduate/technical level or post graduate level complete	0.2389	0.0479	4.992	0
Number of household members aged 60 or above	–0.1614	0.0286	–5.6445	0
Proportion of household members between ages 0 and 6	–0.5535	0.1056	–5.2395	0
Proportion of household members aged 60 or above	0.5871	0.1612	3.6428	0.0003
Dummy variable for ownership of vacuum cleaner	0.0884	0.0236	3.7547	0.0002

Nainawa	Coefficient	Std. Err.	t	|Prob|>t
Intercept	4.481	0.1137	39.4164	0
Dummy variable for age 20–29	0.1584	0.0364	4.3477	0
Car ownership rate in nahiya	0.9682	0.2374	4.0785	0
Dependency ratio	–0.6164	0.05	–12.3298	0
Proportion of household heads with secondary level incomplete or complete in nahiya	–2.8675	0.827	–3.4673	0.0005
Dummy variable for institute level complete	0.3067	0.0433	7.0791	0
Dummy variable for graduate/technical level or post graduate level complete	0.4704	0.0402	11.7007	0
Dummy variable for male	–0.1125	0.0372	–3.0269	0.0025
Dummy variable for maximum education in the household is intermediate level incomplete or complete	–0.0703	0.0241	–2.9107	0.0037
Dummy variable for employment in government/public sector	0.0945	0.0233	4.0542	0.0001
Proportion of household members aged 60 or above	0.4306	0.1053	4.0877	0
Share of working age males employed	0.1632	0.0282	5.7844	0
Proportion of households with vacuum in nahiya	0.7021	0.2194	3.1999	0.0014
Dummy variable for brick wall	0.202	0.0651	3.1056	0.0019
Interaction term for rural area and dummy variable for age of household head 40–49	–0.1254	0.0307	–4.0851	0
Interaction term for urban area and dummy variable for age of household head 70 or more	0.1986	0.062	3.2043	0.0014
Interaction term for urban area and dummy variable for intermediate level incomplete or complete	–0.1578	0.034	–4.6363	0
Interaction term for urban area and dummy variable for secondary level incomplete or complete	0.223	0.051	4.3697	0
Interaction term for urban area and dummy variable for maximum education in the household is institute level complete	0.1128	0.0368	3.0635	0.0022

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Nainawa	**Coefficient**	**Std. Err.**	**t**	**|Prob|>t**
Interaction term for rural area and dummy variable for maximum education in the household is graduate/technical level or post graduate level complete	–0.3075	0.0546	–5.6369	0
Interaction term for urban area and dummy variable for principal material of wall is cement block, concrete readymade, or precast	–0.175	0.0303	–5.7833	0
Interaction term for rural area and main source of drinking water is public network	–0.1054	0.0345	–3.0542	0.0023

Erbil	Coefficient	Std. Err.	t	|Prob|>t
Intercept	5.2698	0.0528	99.761	0
Dummy variable for ownership of air conditioner	0.2025	0.0198	10.229	0
Dummy variable for household head's age 60–69	–0.1976	0.0347	–5.6931	0
Dummy variable for household head's age 70 or more	–0.1776	0.0485	–3.6658	0.0003
Number of children between ages 0 and 6	–0.1448	0.0089	–16.2091	0
Number of children between ages 7 and 17	–0.1134	0.0061	–18.6343	0
Access of electricity from private generator (days per week)	0.0226	0.0081	2.7962	0.0052
Dummy variable for household head has no education	–0.0886	0.0208	–4.2684	0
Dummy variable for household head's education is institute level complete	0.1372	0.0329	4.1712	0
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.1691	0.035	4.8348	0
Number of males employed	–0.0796	0.0258	–3.0803	0.0021
Dummy variable for ownership of freezer	0.0512	0.019	2.6969	0.0071
Dummy variable for dwelling owned by household	0.0779	0.0207	3.7683	0.0002
Dummy variable for male	–0.1134	0.0275	–4.1189	0
Proportion of household members aged 60 or above	0.5115	0.068	7.5191	0
Dummy variable for principal material of wall is brick	0.1217	0.0308	3.9504	0.0001
Dummy variable for ownership of washing machine	0.1047	0.0301	3.482	0.0005

Sulaimaniya	Coefficient	Std. Err.	t	|Prob|>t
Intercept	6.1924	0.0524	118.0758	0
Dummy variable for ownership of air conditioner	0.1231	0.0136	9.029	0
Dummy variable for household head's age 40–49	0.065	0.0146	4.4488	0
Dummy variable for household head's age 70 or more	–0.1832	0.0193	–9.5032	0
Dummy variable for household head has no education	–0.077	0.0136	–5.6396	0
Number of males employed = 0	–0.1912	0.0322	–5.9331	0
Number of males employed = 2	0.0646	0.0188	3.4324	0.0006
Number of males employed = 3	0.104	0.0312	3.3331	0.0009
Dummy variable for ownership of freezer	0.1654	0.0133	12.4547	0
Household size	–0.276	0.0107	–25.8669	0
Square of the household size	0.0132	0.0007	17.6451	0
Dummy variable for maximum education in the household is primary level complete	0.0957	0.0212	4.5099	0
Dummy variable for maximum education in the household is intermediate level incomplete or complete	0.1586	0.0237	6.6977	0
Dummy variable for maximum education in the household is secondary level incomplete or complete	0.1035	0.0234	4.4222	0
Dummy variable for maximum education in the household is institute level complete	0.136	0.026	5.2415	0
Dummy variable for maximum education in the household is graduate/technical level or post graduate level complete	0.1841	0.0252	7.3185	0
Dummy variable for source of electricity is private generator	0.1207	0.0194	6.225	0
Proportion of household members between ages 0 and 6	–0.2624	0.0449	–5.8484	0

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Sulaimaniya	**Coefficient**	**Std. Err.**	**t**	**|Prob|>t**
Proportion of household members between ages 7 and 17	–0.3918	0.0415	–9.4479	0
Share of working age males employed	–0.1511	0.0318	–4.7537	0
Dummy variable for ownership of vacuum cleaner	0.1446	0.0193	7.4855	0
Dummy variable for principal material of wall is cement block, concrete readymade, or precast	0.0478	0.0155	3.0842	0.0021

Diyala	Coefficient	Std. Err.	t	|Prob|>t
Intercept	5.5157	0.0646	85.3229	0
Dummy variable for ownership of air conditioner	0.1232	0.026	4.7361	0
Number of children between ages 0 and 6	–0.0325	0.0108	–3.017	0.0026
Access of electricity from shared generator is five days per week	0.392	0.131	2.9914	0.0028
Dependency ratio	–0.1926	0.0539	–3.5721	0.0004
Dummy variable for household head's education is primary level incomplete	0.093	0.0338	2.7564	0.0059
Dummy variable for ownership of freezer	0.085	0.0224	3.7902	0.0002
Dummy variable for ownership of fridge	0.0859	0.0381	2.2573	0.0242
Dummy variable for ownership of generator	0.1577	0.0204	7.715	0
Household size	–0.2123	0.0126	–16.8536	0
Square of household size	0.0089	0.0008	11.2718	0
Dummy variable for maximum education in the household is graduate/technical level or post graduate level complete	0.0744	0.0274	2.715	0.0067
Dummy variable for ownership of vacuum cleaner	0.0792	0.0268	2.9509	0.0032
Dummy variable for principal material of wall is brick	0.0852	0.0222	3.8317	0.0001

Kirkuk	Coefficient	Std. Err.	t	|Prob|>t
Intercept	4.5162	0.0534	84.5791	0
Dummy variable for ownership of air conditioner	0.1566	0.0264	5.942	0
Dummy variable for household head's age 20–29	0.1218	0.049	2.4832	0.0132
Dummy variable for household head's age 30–39	0.0721	0.03	2.4051	0.0164
Number of children between ages 7 and 17 = 0	0.4608	0.0409	11.2771	0
Number of children between ages 7 and 17 = 1	0.3	0.0373	8.0458	0
Number of children between ages 7 and 17 = 5	–0.1679	0.0735	–2.2846	0.0226
Number of children between ages 7 and 17 = 6	–0.2162	0.0969	–2.2308	0.026
Dependency ratio	0.3195	0.0912	3.504	0.0005
Number of household members aged 60 or above	–0.2209	0.0226	–9.7625	0
Dummy variable for dwelling owned by government/public sector	–0.2496	0.0367	–6.7916	0
Dummy variable for male	0.2447	0.0364	6.7207	0
Dummy variable for maximum education in the household is intermediate level incomplete or complete	–0.0429	0.0294	–1.46	0.1447
Dummy variable for maximum education in the household is institute level complete	0.1868	0.0401	4.6583	0
Dummy variable for employment in private sector	–0.0835	0.0231	–3.6068	0.0003
Proportion of household members between ages 0 and 6	–1.1376	0.1128	–10.0887	0
Proportion of household members aged 60 or above	0.6371	0.1194	5.3334	0
Dummy variable for ownership of vacuum cleaner	0.0738	0.0282	2.6228	0.0089
Dummy variable for principal material of wall is clay, bamboo, or other	–0.2311	0.0332	–6.9655	0
Dummy variable for ownership of washing machine	0.1607	0.0314	5.1105	0

Anbar	Coefficient	Std. Err.	t	|Prob|>t
Intercept	9.5194	1.5028	6.3343	0
Dummy variable for ownership of air conditioner	0.1103	0.0182	6.0541	0
Dummy variable for household head's age 30–39	0.0631	0.0181	3.4807	0.0005
Dummy variable for household head's age 70 or more	0.2148	0.0316	6.7944	0
Access of electricity from private generator (days per week)	0.0207	0.0027	7.7264	0
Dummy variable for household head's education is primary level incomplete	–0.0522	0.0172	–3.0391	0.0024
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.0749	0.0263	2.8447	0.0045
Number of household members aged 60 or above	–0.2119	0.0201	–10.5485	0
Dummy variable for maximum education in the household is secondary level incomplete or complete	–0.0593	0.015	–3.9463	0.0001
Proportion of household heads employed in the private sector in nahiya	–0.5733	0.1907	–3.0064	0.0027
Proportion of household members aged 60 or above	1.654	0.2006	8.2434	0
Proportion of households with television in nahiya	–4.9148	1.508	–3.2592	0.0011
Dummy variable for ownership of vacuum cleaner	0.1586	0.0206	7.6987	0
Dummy variable for ownership of washing machine	0.1902	0.0154	12.3597	0
Interaction of rural area and proportion of household members between ages 0 and 6	–0.1414	0.0585	–2.4175	0.0157
Interaction of urban area and proportion of household members between ages 0 and 6	–0.4129	0.0632	–6.532	0
Interaction of rural area and dummy variable for household head's age 20–29	0.2208	0.048	4.5993	0
Interaction of rural area and dummy variable for ownership of cooler	–0.2111	0.0695	–3.037	0.0024

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Anbar	Coefficient	Std. Err.	t	|Prob|>t
Interaction of urban area and dummy variable for household head has no education	–0.1797	0.0298	–6.0261	0
Interaction of urban area and dummy variable for household head's education is primary level complete	0.0535	0.0202	2.6449	0.0082
Interaction for rural area and no ownership of freezer	–0.1112	0.0199	–5.5849	0
Interaction of rural area and household head is unmarried	–0.1788	0.0388	–4.6122	0
Interaction of rural area and dummy variable for maximum education in the household is no education	–0.4597	0.0913	–5.0346	0
Interaction of rural area and no ownership of water heater	0.1421	0.041	3.4651	0.0005

Salahaddin	Coefficient	Std. Err.	t	|Prob|>t
Intercept	4.7414	0.0576	82.3636	0
Dummy variable for ownership of car	0.1498	0.0211	7.108	0
Number of children between ages 7 and 17	–0.1367	0.01	–13.7257	0
Dummy variable for household head's education is intermediate level incomplete or complete	0.0704	0.0313	2.2487	0.0247
Dummy variable for household head's education is institute level complete	0.0786	0.0344	2.2858	0.0224
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.2015	0.0307	6.571	0
Number of household members aged 60 or above	–0.1876	0.026	–7.2277	0
Dummy variable for ownership of freezer	0.0935	0.0234	3.9894	0.0001
Dummy variable for ownership of generator	0.0595	0.0284	2.0952	0.0363
Dummy variable for married	–0.0973	0.0362	–2.6862	0.0073
Dummy variable for source of electricity is private generator	0.1026	0.0294	3.4835	0.0005
Dummy variable for public sewage network	0.0773	0.0286	2.7	0.007
Proportion of household members between ages 7 and 17	0.593	0.091	6.517	0
Dummy variable for source of electricity is shared generator	0.1428	0.0311	4.5974	0
Proportion of household members aged 60 or above	1.1427	0.1188	9.6224	0
Dummy variable for ownership of vacuum cleaner	0.167	0.0265	6.3022	0
Dummy variable for principal material of wall is clay, bamboo, or other	–0.1606	0.0332	–4.8437	0
Dummy variable for main source of drinking water is public network	–0.1386	0.0361	–3.8377	0.0001
Dummy variable for ownership of water heater	0.0911	0.0344	2.6491	0.0081

Baghdad	Coefficient	Std. Err.	t	|Prob|>t
Intercept	5.1627	0.1438	35.8925	0
Dummy variable for household head's age 20–29	0.2228	0.0368	6.0605	0
Dummy variable for household head's age 40–49	–0.0806	0.0202	–3.9872	0.0001
Access of electricity from shared generator (days per week)	0.0209	0.0053	3.9125	0.0001
Dummy variable for household head has no education	–0.0878	0.0271	–3.2369	0.0012
Proportion of household heads with primary level incomplete in nahiya	–0.5831	0.1813	–3.2153	0.0013
Dummy variable for household head's education is secondary level incomplete or complete	0.1531	0.0285	5.3672	0
Dummy variable for household head's education is institute level complete	0.1411	0.0419	3.367	0.0008
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.1943	0.0357	5.4473	0
Dummy variable for ownership of generator	0.1773	0.0194	9.1257	0
Proportion of households with generator in nahiya	–0.2233	0.0723	–3.0866	0.0021
Average household size in nahiya	–0.0786	0.0194	–4.0643	0
Dummy variable for maximum education in the household is no education	0.132	0.0596	2.215	0.0269
Dummy variable for maximum education in the household is institute level complete	0.0861	0.0355	2.4289	0.0152
Dummy variable for maximum education in the household is graduate/technical level or post graduate level complete	0.115	0.028	4.0986	0
Average distance to the nearest road in nahiya	–0.0228	0.0041	–5.6366	0
Average distance to the nearest school in nahiya	0.0146	0.0047	3.126	0.0018
Average distance to the nearest school in qhada	0.0206	0.0068	3.0515	0.0023
Dummy variable for household head is unemployed	–0.0816	0.0213	–3.8406	0.0001
Dummy variable for public sewage network	0.0582	0.0266	2.1868	0.0289
Dummy variable for closed drain, open drain, or other	–0.099	0.0426	–2.3211	0.0204

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Baghdad	**Coefficient**	**Std. Err.**	**t**	**|Prob|>t**
Proportion of household members between ages 0 and 6	–0.5569	0.0513	–10.8565	0
Proportion of household members aged 60 or above	0.7274	0.0523	13.9089	0
Dummy variable for principal material of wall is cement block, concrete readymade, or precast	–0.0945	0.0294	–3.2141	0.0013

Babylon	Coefficient	Std. Err.	t	|Prob|>t
Intercept	4.9265	0.0485	101.5122	0
Dummy variable for ownership of air conditioner	0.1228	0.0284	4.3241	0
Dummy variable for household head's age 20–29	0.1555	0.0476	3.2661	0.0011
Dummy variable for household head's age 40–49	0.1152	0.0262	4.3909	0
Dummy variable for ownership of car	0.185	0.0262	7.0752	0
Number of children between ages 7 and 17	–0.1277	0.0116	–10.9606	0
Dummy variable for household head has no education	–0.1235	0.0321	–3.8471	0.0001
Dummy variable for household head's education is institute level complete	0.1269	0.0411	3.0867	0.0021
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.1962	0.0459	4.2711	0
Dummy variable for housing unit is clay house, bamboo house, or other	–0.2327	0.0997	–2.3331	0.0199
Dummy variable for maximum education in the household is no education	0.2641	0.0844	3.1305	0.0018
Dummy variable for maximum education in the household is graduate/technical level or post graduate level complete	–0.0761	0.0346	–2.1962	0.0284
Proportion of household members between ages 0 and 6	–0.6639	0.0776	–8.5525	0
Proportion of household members between ages 7 and 17	0.2961	0.1133	2.6143	0.0091
Proportion of household members aged 60 or above	0.4701	0.0879	5.3462	0
Dummy variable for ownership of vacuum cleaner	0.1376	0.0314	4.3861	0
Dummy variable for ownership of washing machine	0.1081	0.0274	3.9384	0.0001

Kerbala	Coefficient	Std. Err.	t	|Prob|>t
Intercept	5.6676	0.0662	85.5919	0
Dummy variable for household head's age 40–49	–0.0627	0.0201	–3.1227	0.0019
Dummy variable for ownership of car	0.2661	0.0199	13.3632	0
DAYS_SHARED_GENERATOR_6 Days	0.4051	0.1575	2.5721	0.0104
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.0717	0.0591	1.2141	0.2252
Number of employed male = 3	0.1136	0.0289	3.9327	0.0001
Number of employed = 5	–0.2476	0.0376	–6.5855	0
Dummy variable for ownership of freezer	0.1112	0.0177	6.269	0
Household size	–0.1925	0.0082	–23.3487	0
Square of household size	0.0069	0.0003	20.5117	0
Dummy variable for maximum education in the household is graduate/technical level or post graduate level complete	0.2979	0.0346	8.6188	0
Dummy variable for public sewage network	0.1022	0.0217	4.7115	0
Proportion of household members between ages 7 and 17	–0.1373	0.0486	–2.8237	0.0049
Dummy variable for ownership of vacuum cleaner	0.075	0.02	3.7413	0.0002
Dummy variable for principal material of wall is brick	0.1056	0.0176	5.9929	0
Dummy variable for ownership of washing machine	0.0976	0.02	4.8741	0
Dummy variable for main source of drinking water is public network	–0.1681	0.0372	–4.5153	0
Interaction of urban area and proportion of household members between ages 0 and 6	–0.3987	0.0654	–6.0936	0
Interaction of urban area and dummy variable for born outside the governorate	0.0838	0.0222	3.7738	0.0002
Interaction of rural area and dummy variable for household head has no education	0.1982	0.0287	6.8934	0

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(*continued*)

Kerbala	**Coefficient**	**Std. Err.**	**t**	**|Prob|>t**
Interaction of urban area and dummy variable for household head's education is primary level incomplete	–0.118	0.0277	–4.2607	0
Interaction of rural area and dummy variable for household head's education is graduate/technical level or post graduate level complete	–0.4603	0.0828	–5.5616	0
Interaction for rural area and number of employed males = 2	0.1744	0.032	5.4438	0
Interaction of rural area and no fridge ownership	–0.0994	0.0313	–3.1785	0.0016
Interaction of urban area and dummy variable for dwelling owned by government/public sector	–0.2024	0.037	–5.4674	0
Interaction for rural area and dummy variable for not married	–0.1223	0.044	–2.7778	0.0057
Interaction for urban area and dummy variable for maximum education in the household is institute level complete	0.2218	0.0381	5.8234	0
Interaction for urban area and dummy variable for maximum education in the household is graduate/technical level or post graduate level complete	–0.2663	0.042	–6.3386	0
Interaction of rural area and dummy variable for no public sewage network	–0.0525	0.0262	–2.0015	0.0458
Interaction of urban area and dummy variable for no public sewage network	–0.1196	0.0848	–1.4103	0.159

Wasit	Coefficient	Std. Err.	t	|Prob|>t
Intercept	4.5919	0.1104	41.5748	0
Dummy variable for household head's age 50–59	–0.1174	0.0339	–3.4694	0.0005
Dummy variable for household head's age 60–69	–0.167	0.04	–4.1721	0
Dummy variable for household head's age 70 or more	–0.1655	0.057	–2.9043	0.0037
Dummy variable for ownership of car	0.1661	0.0271	6.1309	0
Dependency ratio	0.229	0.1087	2.1058	0.0354
Dummy variable for household head's education is secondary level incomplete or complete	0.1687	0.0473	3.5675	0.0004
Dummy variable for household head's education is institute level complete	0.2637	0.0426	6.1918	0
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.3942	0.0573	6.8851	0
Dummy variable for maximum education in the household is graduate/technical level or post graduate level complete	–0.1478	0.0409	–3.612	0.0003
Dummy variable for house provided by employer, free with and without arrangement with owner, random housing	–0.0566	0.0326	–1.7354	0.0829
Dummy variable for source of electricity is private generator	0.1602	0.0262	6.1167	0
Average distance to the nearest road in qhada	0.0502	0.0148	3.3957	0.0007
Dummy variable for household head is employed in the government/public sector	0.1399	0.0293	4.7745	0
Proportion of household members between ages 0 and 6	–1.2854	0.1321	–9.7335	0
Proportion of household members between ages 7 and 17	–1.0538	0.1004	–10.5013	0
Dummy variable for principal material of wall is brick	0.1838	0.0302	6.0824	0
Dummy variable for principal material of wall is clay, bamboo, or other	–0.1518	0.0403	–3.7643	0.0002
Dummy variable for ownership of washing machine	0.1545	0.0286	5.3937	0

Najaf	Coefficient	Std. Err.	t	|Prob|>t
Intercept	4.9407	0.0898	55.0178	0
Dummy variable for household head's age 60–69	–0.2382	0.0464	–5.1312	0
Dummy variable for household head's age 70 or more	–0.3048	0.0625	–4.8803	0
Dummy variable for ownership of car	0.2598	0.0321	8.0968	0
Access of electricity from shared generator (days per week)	0.0227	0.0085	2.676	0.0076
Dummy variable for household head's education is primary level incomplete	–0.0867	0.042	–2.0647	0.0394
Dummy variable for closed drain, open drain, or other	–0.1819	0.0496	–3.6683	0.0003
Proportion of household members between ages 0 and 6	–0.8441	0.1069	–7.8961	0
Proportion of household members between ages 7 and 17	–0.8001	0.0878	–9.1158	0
Proportion of household members aged 60 or above	0.9792	0.0939	10.4314	0
Dummy variable for ownership of vacuum cleaner	0.298	0.0338	8.8137	0
Dummy variable for principal material of wall is brick	0.0455	0.0443	1.0265	0.305
Dummy variable for ownership of water heater	0.1324	0.0395	3.3496	0.0009

Qadisiyah	Coefficient	Std. Err.	t	|Prob|>t
Intercept	4.1158	1.091	3.7725	0.0002
Dummy variable for ownership of air conditioner	0.1132	0.0274	4.1338	0
Dummy variable for household head's age 50–59	–0.0912	0.0306	–2.983	0.0029
Dummy variable for household head's age 70 or more	0.1722	0.0561	3.0725	0.0022
Dummy variable for born outside the governorate	–0.1563	0.0426	–3.6696	0.0003
Number of children between ages 7 and 17	–0.0798	0.0076	–10.5558	0
Proportion of households owning cooker in nahiya	–0.7713	0.1731	–4.4556	0
Dummy variable for household head has no education	–0.0786	0.0324	–2.4214	0.0157
Number of household members aged 60 or above	–0.252	0.0327	–7.6966	0
Number of males employed = 1	0.1017	0.0239	4.2615	0
Number of males employed = 3	–0.0803	0.0452	–1.7754	0.0762
Dummy variable for ownership of generator	0.1363	0.0227	5.9993	0
Dummy variable for housing unit is house or flat	0.1253	0.0426	2.9432	0.0033
Dummy variable for ownership of personal computer	0.2552	0.0411	6.2037	0
Dummy variable for household head is employed in the government/public sector	0.1429	0.0254	5.6292	0
Proportion of household heads employed in government/public sector in nahiya	1.5853	0.3441	4.6066	0
Dummy variable for septic tank	0.1357	0.0253	5.3648	0
Proportion of household members between ages 0 and 6	–0.5783	0.0822	–7.0359	0
Proportion of household members aged 60 or above	1.1729	0.2434	4.8199	0
Proportion of households with television in nahiya	0.3725	1.1976	0.311	0.7559
Dummy variable for ownership of vacuum cleaner	0.1185	0.0485	2.4428	0.0148
Dummy variable for principal material of wall is brick	0.0704	0.0292	2.4135	0.016
Dummy variable for ownership of washing machine	0.1293	0.0267	4.8403	0
Dummy variable for main source of drinking water is river/canal/creek/wheel, open well/covered well, pond/lake, spring, kehriz (man built spring) or other	0.2107	0.0387	5.4397	0

Muthana	Coefficient	Std. Err.	t	|Prob|>t
Intercept	4.5534	0.0606	75.1531	0
Number of children between ages 7 and 17	–0.0574	0.0066	–8.7278	0
Dummy variable for ownership of cooler	–0.0304	0.0272	–1.1182	0.2638
Dummy variable for household head has no education	–0.068	0.0262	–2.5933	0.0097
Dummy variable for household head's education is institute level complete	0.1423	0.0506	2.815	0.005
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.2176	0.0669	3.2553	0.0012
Number of household members aged 60 or above	–0.1147	0.0252	–4.5498	0
Dummy variable for maximum education in the household is primary level complete	0.0343	0.0295	1.1609	0.246
Dummy variable for household head is employed in the government/public sector	0.0723	0.031	2.3328	0.0199
Dummy variable for closed drain, open drain, or other	–0.1159	0.0257	–4.5101	0
Proportion of household members between ages 0 and 6	–0.6814	0.0877	–7.7694	0
Proportion of household members aged 60 or above	0.6669	0.2058	3.2408	0.0012
Dummy variable for ownership of vacuum cleaner	0.1181	0.045	2.624	0.0089
Dummy variable for principal material of wall is cement block, concrete readymade, or precast	–0.0802	0.0247	–3.2477	0.0012
Dummy variable for ownership of washing machine	0.2057	0.0265	7.768	0

Thi Qar	Coefficient	Std. Err.	t	|Prob|>t
Intercept	5.4467	0.0601	90.6953	0
Dummy variable for ownership of air conditioner	0.0644	0.0232	2.7776	0.0056
Dummy variable for ownership of car	0.1211	0.0228	5.3074	0
Access of electricity from private generator (days per week)	0.0182	0.003	6.0164	0
Dependency ratio	–0.2628	0.0436	–6.0242	0
Dummy variable for household head's education is institute level complete	0.0876	0.0313	2.8005	0.0052
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.2048	0.0406	5.0473	0
Dummy variable for ownership of freezer	0.1461	0.021	6.9548	0
Dummy variable for ownership of fridge	0.1347	0.0303	4.4452	0
Household size	–0.2168	0.0111	–19.5221	0
Square of household size	0.0076	0.0006	13.2288	0
Dummy variable for male	–0.0984	0.0327	–3.0142	0.0026
Dummy variable for maximum education in the household is primary level incomplete	–0.1203	0.0289	–4.1566	0
Dummy variable for house rented by households	0.0944	0.0369	2.5595	0.0106
Dummy variable for household head is employed in the government/public sector	0.0582	0.0203	2.8614	0.0043
Dummy variable for public sewage network	0.1148	0.0311	3.6908	0.0002
Proportion of household members between ages 7 and 17	–0.0922	0.0472	–1.9521	0.0512
Dummy variable for ownership of vacuum cleaner	0.1862	0.0343	5.4328	0
Dummy variable for principal material of wall is brick	0.0443	0.0211	2.1035	0.0357
Dummy variable for ownership of washing machine	0.0834	0.0213	3.9211	0.0001
Dummy variable for ownership of water heater	0.1102	0.0264	4.1723	0

Missan	Coefficient	Std. Err.	t	|Prob|>t
Intercept	7.4427	0.8849	8.4107	0
Dummy variable for ownership of air conditioner	0.1372	0.0249	5.5049	0
Dummy variable for household head's age 30–39	0.0739	0.0251	2.9401	0.0033
Average days of electricity from private generator in qhada	0.2281	0.1042	2.1896	0.0287
Average days of electricity from public network in nahiya	–0.4565	0.1435	–3.1813	0.0015
Average days of electricity from shared generator in qhada	0.1161	0.0315	3.6899	0.0002
Dummy variable for household head has no education	–0.0893	0.0272	–3.2844	0.0011
Dummy variable for household head's education is graduate/technical level or post graduate level complete	0.3723	0.0453	8.2271	0
Dummy variable for male	–0.3094	0.0346	–8.9303	0
Dummy variable for maximum education in the household is no education	0.1726	0.0468	3.6874	0.0002
Dummy variable for source of electricity is private generator	0.0916	0.0265	3.4515	0.0006
Dummy variable for household head is unemployed	–0.2696	0.0315	–8.553	0
Dummy variable for household head employed in the private sector	–0.1321	0.0256	–5.1631	0
Proportion of household members between ages 0 and 6	–0.6436	0.0734	–8.7679	0
Proportion of household members between ages 7 and 17	–0.7293	0.062	–11.7611	0
Dummy variable for source of electricity is shared generator	0.1034	0.0346	2.9905	0.0028
Proportion of household members aged 60 or above	0.6113	0.0869	7.0378	0
Share of working age males employed	0.0865	0.0321	2.695	0.0071
Dummy variable for ownership of vacuum cleaner	0.214	0.0398	5.3733	0
Dummy variable for principal material of wall is cement block, concrete readymade, or precast	–0.1561	0.0282	–5.534	0
Dummy variable for principal material of wall is clay, bamboo, or other	–0.1103	0.0449	–2.455	0.0142
Dummy variable for main source of drinking water is river/canal/creek/wheel, open well/covered well, pond/lake, spring, kehriz (man built spring) or other	–0.1302	0.035	–3.7244	0.0002

Basrah	Coefficient	Std. Err.	t	|Prob|>t
Intercept	4.518	0.0423	106.7698	0
Dummy variable for household head's age 20–29	0.0838	0.025	3.3472	0.0008
Dummy variable for household head's age 50–59	–0.0458	0.0222	–2.0604	0.0395
Dummy variable for household head's age 70 or more	–0.0944	0.0322	–2.9315	0.0034
Number of children between ages 0 and 6 = 0	0.462	0.022	20.9653	0
Number of children between ages 0 and 6 = 1	0.2539	0.0199	12.7809	0
Number of children between ages 0 and 6 = 2	0.1697	0.0196	8.6679	0
Number of children between ages 0 and 6 = 10	–0.8232	0.1265	–6.5098	0
Proportion of household members between ages 7 and 17	–0.0915	0.0041	–22.146	0
Number of employed male = 0	0.1234	0.0259	4.762	0
Number of employed male = 1	0.1161	0.0179	6.5011	0
Dummy variable for ownership of freezer	0.0691	0.0171	4.0301	0.0001
Dummy variable for ownership of generator	0.0838	0.0278	3.0124	0.0026
Dummy variable for housing unit is clay house, bamboo house, or other	0.275	0.1794	1.533	0.1255
Dummy variable for married	–0.1014	0.0263	–3.8502	0.0001
Dummy variable for house rented by households	–0.0907	0.0228	–3.9863	0.0001
Dummy variable for source of electricity is private generator	0.0605	0.0273	2.2213	0.0265
Dummy variable for household head is employed in the government/public sector	0.0853	0.0172	4.963	0
Dummy variable for source of electricity is shared generator	0.0537	0.024	2.2341	0.0256
Dummy variable for ownership of vacuum cleaner	0.1897	0.022	8.6279	0
Dummy variable for principal material of wall is brick	0.0846	0.0163	5.2013	0
Dummy variable for principal material of wall is clay, bamboo, or other	–0.3441	0.1838	–1.8727	0.0613

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Basrah	**Coefficient**	**Std. Err.**	**t**	**|Prob|>t**
Dummy variable for ownership of washing machine	0.0438	0.0181	2.4173	0.0158
Dummy variable for ownership of water heater	0.0977	0.02	4.8759	0
Interaction of urban area with dummy variable for household head's education is graduate/technical level or post graduate level complete	0.1117	0.0374	2.9894	0.0028
Interaction of urban area with dummy variable for maximum education in the household is primary level incomplete	–0.1752	0.0269	–6.5183	0

Appendix C: Summary Statistics of Key Variables

	IHSES				IPMM			
	Mean	Std. Err.	[95% Conf.	Interval]	Mean	Std. Err.	[95% Conf.	Interval]
Urban	0.68	0.01	0.66	0.70	0.70	0.00	0.69	0.71
Household size	8.42	0.06	8.29	8.54	7.64	0.02	7.60	7.68
Household size sq.	88.67	1.93	84.89	92.45	71.66	0.44	70.79	72.53
Dependency ratio	0.44	0.00	0.44	0.45	0.44	0.00	0.43	0.44
Number of children between ages 0 and 6	1.84	0.03	1.78	1.89	1.61	0.01	1.59	1.62
Proportion of household members between ages 0 and 6	0.21	0.00	0.20	0.21	0.20	0.00	0.20	0.20
Number of children between ages 7 and 17	2.34	0.03	2.28	2.39	2.14	0.01	2.13	2.16
Proportion of household members between ages 7 and 17	0.27	0.00	0.26	0.27	0.27	0.00	0.27	0.27
Number of household members aged 60 or above	0.40	0.01	0.39	0.42	0.33	0.00	0.32	0.33
Proportion of household members aged 60 or above	0.05	0.00	0.05	0.06	0.05	0.00	0.05	0.05
Number of males employed	1.46	0.01	1.44	1.49	1.29	0.00	1.28	1.30
Share of working age males employed	0.69	0.00	0.69	0.70	0.67	0.00	0.67	0.67
Dummy variable for maximum education in the household is no education	0.02	0.00	0.02	0.03	0.03	0.00	0.03	0.03
Dummy variable for maximum education in the household is primary level incomplete	0.09	0.00	0.08	0.10	0.08	0.00	0.08	0.08
Dummy variable for maximum education in the household is primary level complete	0.21	0.00	0.20	0.22	0.19	0.00	0.19	0.19
Dummy variable for maximum education in the household is intermediate level incomplete or complete	0.20	0.00	0.20	0.21	0.21	0.00	0.20	0.21
Dummy variable for maximum education in the household is secondary level incomplete or complete	0.16	0.00	0.15	0.17	0.17	0.00	0.17	0.17

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	IHSES				IPMM			
	Mean	Std. Err.	[95% Conf.	Interval]	Mean	Std. Err.	[95% Conf.	Interval]
Dummy variable for maximum education in the household is institute level complete	0.10	0.00	0.10	0.11	0.10	0.00	0.10	0.10
Dummy variable for maximum education in the household is graduate/technical level or post graduate level complete	0.21	0.01	0.20	0.22	0.23	0.00	0.23	0.23
Dummy variable for household head's age 20–29	0.06	0.00	0.06	0.07	0.07	0.00	0.07	0.07
Dummy variable for household head's age 30–39	0.23	0.00	0.22	0.24	0.24	0.00	0.24	0.25
Dummy variable for household head's age 40–49	0.31	0.01	0.30	0.32	0.31	0.00	0.31	0.31
Dummy variable for household head's age 50–59	0.19	0.00	0.19	0.20	0.20	0.00	0.19	0.20
Dummy variable for household head's age 60–69	0.14	0.00	0.13	0.15	0.12	0.00	0.12	0.12
Dummy variable for household head's age 70 or more	0.06	0.00	0.05	0.06	0.06	0.00	0.06	0.06
Dummy variable for household head is male	0.90	0.00	0.90	0.91	0.92	0.00	0.92	0.92
Dummy variable for household head is born outside the governorate	0.13	0.00	0.12	0.13	0.13	0.00	0.12	0.13
Dummy variable for household head is married	0.90	0.00	0.89	0.91	0.91	0.00	0.91	0.91
Dummy variable for household head has no education	0.23	0.00	0.22	0.24	0.23	0.00	0.23	0.23
Dummy variable for household head's education is primary level incomplete	0.15	0.00	0.14	0.16	0.11	0.00	0.11	0.12
Dummy variable for household head's education is primary level complete	0.28	0.00	0.28	0.29	0.29	0.00	0.29	0.29
Dummy variable for household head's education is intermediate level incomplete or complete	0.11	0.00	0.10	0.11	0.12	0.00	0.12	0.12
Dummy variable for household head's education is secondary level incomplete or complete	0.08	0.00	0.07	0.09	0.09	0.00	0.08	0.09
Dummy variable for household head's education is institute level complete	0.07	0.00	0.07	0.08	0.07	0.00	0.07	0.07

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	IHSES				IPMM			
	Mean	Std. Err.	[95% Conf.	Interval]	Mean	Std. Err.	[95% Conf.	Interval]
Dummy variable for household head's education is graduate/ technical level or post graduate level complete	0.08	0.00	0.07	0.09	0.09	0.00	0.09	0.09
Dummy variable for household head is unemployed	0.28	0.01	0.27	0.29	0.31	0.00	0.31	0.32
Dummy variable for household head is employed in the government/public sector	0.29	0.01	0.28	0.30	0.29	0.00	0.29	0.30
Dummy variable for household head employed in the private sector	0.43	0.01	0.42	0.44	0.39	0.00	0.39	0.40
Dummy variable for ownership of cooler	0.89	0.00	0.89	0.90	0.89	0.00	0.89	0.89
Dummy variable for ownership of fridge	0.93	0.00	0.92	0.93	0.94	0.00	0.94	0.95
Dummy variable for ownership of freezer	0.49	0.01	0.48	0.50	0.50	0.00	0.50	0.51
Dummy variable for ownership of washing machine	0.70	0.01	0.68	0.71	0.71	0.00	0.70	0.71
Dummy variable for ownership of generator	0.36	0.01	0.35	0.37	0.28	0.00	0.28	0.29
Dummy variable for ownership of water heater	0.89	0.00	0.88	0.90	0.85	0.00	0.85	0.85
Dummy variable for ownership of air conditioner	0.42	0.01	0.40	0.43	0.40	0.00	0.39	0.41
Dummy variable for ownership of vacuum cleaner	0.30	0.01	0.29	0.31	0.29	0.00	0.28	0.30
Dummy variable for ownership of car	0.32	0.01	0.31	0.33	0.40	0.00	0.40	0.41
Dummy variable for ownership of personal computer	0.21	0.01	0.20	0.22	0.08	0.00	0.08	0.08
Dummy variable for housing unit is house or flat	0.94	0.00	0.93	0.94	0.95	0.00	0.94	0.95
Dummy variable for housing unit is clay house, bamboo house, or other	0.06	0.00	0.06	0.07	0.05	0.00	0.05	0.06
Dummy variable for principal material of wall is brick	0.45	0.01	0.44	0.46	0.45	0.00	0.44	0.46
Dummy variable for principal material of wall is stone or thermo stone	0.07	0.00	0.06	0.07	0.05	0.00	0.05	0.06

(*continued on next page*)

(*continued*)

	IHSES				IPMM			
	Mean	Std. Err.	[95% Conf.	Interval]	Mean	Std. Err.	[95% Conf.	Interval]
Dummy variable for principal material of wall is cement block, concrete readymade, or precast	0.43	0.01	0.41	0.44	0.43	0.00	0.42	0.44
Dummy variable for principal material of wall is clay, bamboo, or other	0.06	0.00	0.05	0.06	0.07	0.00	0.07	0.07
Dummy variable for dwelling owned by household	0.71	0.01	0.69	0.72	0.74	0.00	0.74	0.75
Dummy variable for dwelling owned by private sector	0.21	0.01	0.19	0.22	0.15	0.00	0.15	0.16
Dummy variable for dwelling owned by government/public sector	0.09	0.01	0.07	0.10	0.10	0.00	0.10	0.11
Dummy variable for house owned by household	0.71	0.01	0.69	0.72	0.74	0.00	0.74	0.75
Dummy variable for house rented by households	0.13	0.01	0.12	0.14	0.12	0.00	0.12	0.13
Dummy variable for house provided by employer, free with and without arrangement with owner, random housing	0.16	0.01	0.14	0.17	0.13	0.00	0.13	0.14
Dummy variable for source of electricity is shared generator	0.84	0.01	0.83	0.86	0.86	0.00	0.86	0.87
Dummy variable for source of electricity is private generator	0.31	0.01	0.30	0.32	0.25	0.00	0.25	0.26
Access of electricity from public network (days per week)	6.91	0.02	6.88	6.94	6.79	0.01	6.78	6.80
Access of electricity from shared generator (days per week)	5.60	0.06	5.49	5.71	5.91	0.02	5.87	5.94
Access of electricity from private generator (days per week)	1.17	0.03	1.10	1.24	0.83	0.01	0.80	0.85
Dummy variable for public sewage network	0.33	0.01	0.31	0.34	0.34	0.01	0.33	0.35
Dummy variable for septic tank	0.51	0.01	0.50	0.53	0.48	0.00	0.47	0.49
Dummy variable for closed drain, open drain, or other	0.16	0.01	0.15	0.17	0.18	0.00	0.17	0.18
Dummy variable for main source of drinking water is public network	0.88	0.01	0.87	0.90	0.88	0.00	0.88	0.89
Dummy variable for main source of drinking water is river/canal/creek/wheel, open well/covered well, pond/lake, spring, kehriz (man built spring) or other	0.09	0.01	0.08	0.10	0.09	0.00	0.09	0.09