



Guinea, Liberia and Sierra Leone

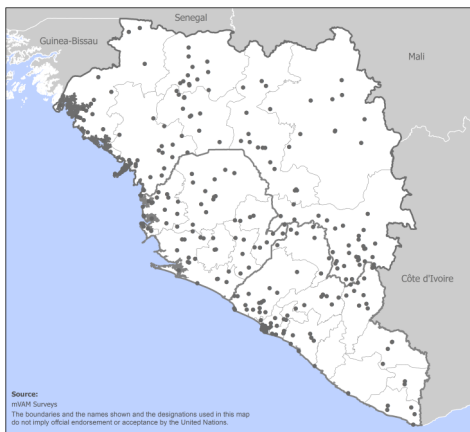
June 2015: More negative coping as lean season begins.

Tracking food security during the Ebola Virus Disease (EVD) outbreak

Highlights

- With the onset of the lean season, the consistent improvements in coping seen over the last five months came to a halt in Liberia and Sierra Leone. Overall, negative coping levels were higher in Guinea than in Liberia or Sierra Leone.
- In Liberia, negative coping was most severe in the South East and in Bong County. In Guinea, the most severe coping levels were reported in Nzerekore region.
- In Liberia and Sierra Leone, heavy seasonal rains were deteriorating road access.
- Food prices remained generally stable in Sierra Leone and Liberia. Thanks to an improvement in manual labor rates, wage-to-rice terms of trade rose in Liberia and parts of Sierra Leone.

GUINEA, LIBERIA, SIERRA LEONE - Reduced Coping Strategies Index (rCSI)
JUNE 2015



Methodology

June 2015 marked the ninth round of data collection, using SMS for all three countries. A total of 1,150 questionnaires were collected in Liberia from June 16th to the 19th. 1,020 questionnaires were completed in Sierra Leone from the 13th to the 17th. In Guinea, 2,099 questionnaires were completed from the 11th to the 30th. June was also the first month of data collection in Guinea after a four-month hiatus; this means that comparisons with the previous month are not offered for Guinea in this issue. The map below shows the cell phone towers from which responses were received. Details on methodology are available [online](#).

New Ebola cases in Guinea and Sierra Leone. One new case in Liberia after several Ebola-free weeks.

In the week to 28 June, 12 new Ebola cases were reported in Boke, Conakry and Forecariah prefectures in Guinea. In the preceding four weeks or more, all three prefectures had reported cases, but the areas of active transmission within those prefectures has changed.

In Sierra Leone, the EVD transmission continues to remain concentrated in several chiefdoms of Kambia and Port Loko districts and in a single neighborhood (the Western Area Urban district) of the capital, Freetown. In the week to 28 June, a total of eight new cases of Ebola were reported in these three districts, the same as the previous week.

In Liberia a new case of Ebola was identified in Margibi County on 29 June — the first new confirmed case in the country since 20 March.

Source: [WHO Ebola Situation Report, 1 July 2015](#)

The rCSI measures the frequency and severity of the mechanisms households employ such as skipping meals or reducing the size of portions when faced with food shortages. A higher score indicates that households are resorting to more frequent or severe negative coping strategies. Detailed information on the rCSI can be found [here](#).

With the onset of the lean season, the consistent improvements in coping seen over the last five months unfortunately came to a halt in Sierra Leone and reversed course in Liberia. The lean season is the time of year when household food stocks are at their annual low before the harvest. The beginning of the lean season also coincides with that of the rainy season in Liberia, compounding difficulties because road and market access are restricted. Overall, negative coping levels were higher in Guinea than in Liberia or Sierra Leone.

Households use more coping strategies in the South East region and in Bong County, Liberia

The rCSI in Liberia rose by 7.1% between May and June with an average increase of 0.7 per respondent.**¹ Nationally the proportion of individuals who cut meal frequency as a coping strategy increased from 70.2% to 72.2%.**² Reduced coping levels increased in the traditionally poor and highly food-insecure counties in Southeast Liberia (Grand Gedeh, Grand Kru, Maryland, River Ghee, River Cess, Sinoe). Mean rCSI for this region increased by 24.6% for June.**¹ The onset of the lean season and the seasonal deterioration of roads is the most probable cause for the increased negative coping.

Bong County, usually the least food-insecure region in Liberia, was one of only two counties in the country with statistically significant increases in reduced coping from May to June. Coping levels as measured by the rCSI mean increased by 19.8% in June*³. This is possibly attributable to the rainy season's impact on Bong County where rainfall for the month of June was 98% of average, 230mm (as tabulated by the VAM Seasonal Monitor). Other parts of Liberia, particularly the SE and coastal regions received only on average 85% of their typical rainfall for the month.

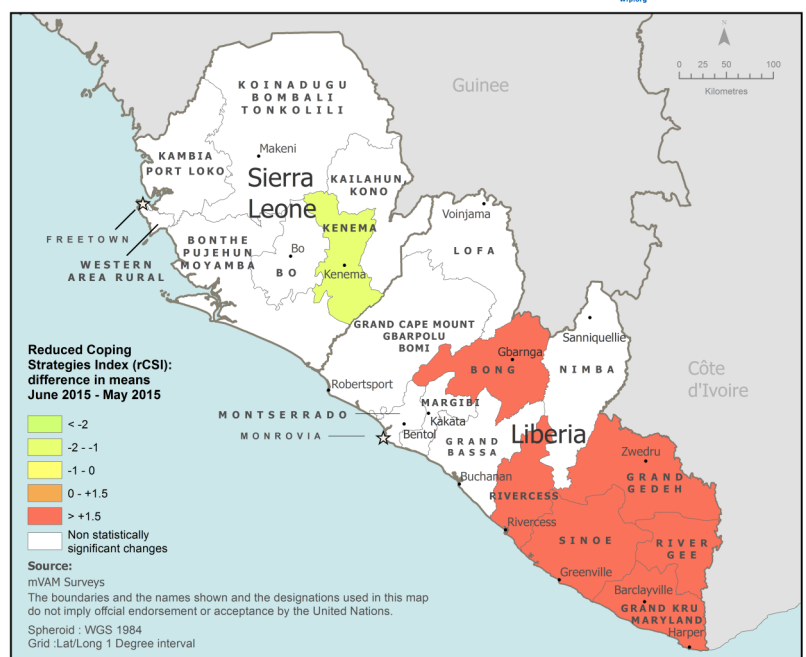
National improvements in the coping strategies for Sierra Leone halt in June

Sierra Leone, which had seen improvements in coping strategies in May, showed no statistically significant change in its rCSI at a national level for June. In Kenema District the rCSI decreased by 11.1% from May to June.**¹ This district is less affected by seasonal variation in food crop production because it has a mixed cash-crop and mining economy.

Prevalence of reduced coping decreased from 83.8% to 80.9%**² amongst respondents using bush/dirt-pit latrines but increased amongst those who use their own flush toilet, rising from 59.4% to 69.5%.**² These two groups are respectively the poorest/most food-insecure households and wealthiest/least food-insecure households typically seen in our survey. Examining the prevalence of individual coping strategies reveals a possible explanation for this anomaly. Amongst bush/dirt-pit latrine respondents, 83.3% used less expensive food purchases as a coping strategy, a decline from the previous month at 86.9%.*²

Figure 2. Administrative agglomerations with statistically significant changes in rCSI, Sierra Leone and Liberia

LIBERIA, SIERRA LEONE - Reduced Coping Strategies Index (rCSI) - difference in means
JUNE 2015 - MAY 2015



Source: WFP mVAM

This corresponds to the statistically significant increase in manual labour wages that this group also reported for the month of June. However, in June, 43.6% of private flush toilet respondents reported borrowing or getting help from a friend or family member as a coping strategy. This is a statistically significant jump from the previous month where only 35.6% of such respondents reported using this strategy.*²

Overall negative coping levels were higher in Guinea than in Liberia or Sierra Leone

In Guinea the data suggests that households use more negative coping strategies than their Sierra Leonean and Liberian neighbors. Similarly, the capital city area was better off (rCSI=16.9) than other administrative areas. Coping levels were remarkably high in Nzerekore (rCSI=23.2), the area of Guinea most affected by Ebola epidemic quarantines. The rCSI was also elevated in Boke (20.7), Farranah (21.1) and Kankan (20.2). Elevated rCSI levels in Guinea may be associated with continued restrictions on movement in Boke and also with the onset of the lean season.

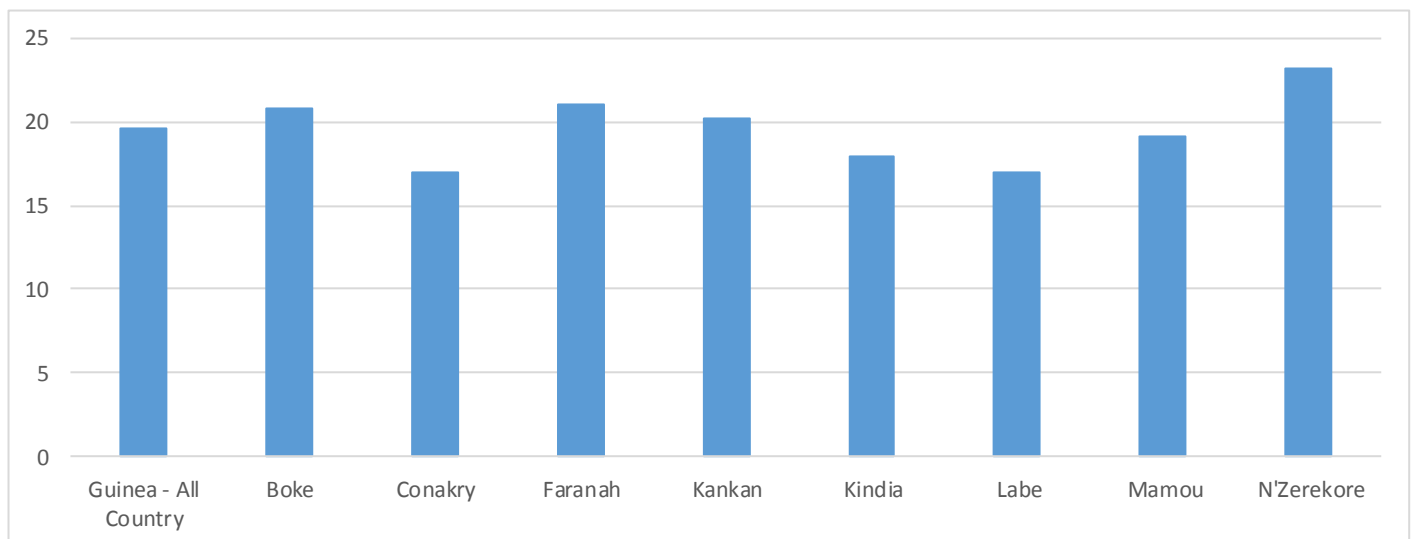
Panel data analysis shows continued improvements in coping

As far as possible, the same respondents were polled month after month. Our dataset contains at least four months of observations for 729 of 1988 unique respondents for Liberia (36.7%) and 654 of 1887 unique respondents for Sierra Leone (34.7%). Given the context, it was not feasible to attain repeat response rates of 100 percent, but the dataset was sufficient to perform longitudinal regression to isolate trends in time. The regression model controlled for dynamics arising from toilet type, fixed effects by district, and random effects of the respondents themselves, while rCSI was the dependent variable in the regression. The full specification of the mixed-effects panel data regression model is in the appendix, along with tables of the regression results.

For Liberia, the fully specified model possessed an R2 value of 0.76. That means it was able to explain 76 percent of the variance in rCSI – an acceptable result. The estimates showed that the average household has experienced a month-on-month improvement of 4.6 percent (p<0.01), but within a 95 percent confidence interval of 3.0 percent to 6.3 percent, starting from January. This corresponds to what we see from an exponential decay regression (this model yields the percentage change in time) on the overall average rCSI across each month. The result, depicted below, shows a 3.4 percent decrease month over month.

For Sierra Leone, the model offered a slightly better fit with an R2=0.79 and it estimated an average household monthly improvement of 8.42 percent inside a 95 percent confidence interval of 6.69 percent to 10.14 percent. This is a very surprising result, for unlike Liberia, Sierra Leone has yet to entirely eliminate Ebola. Yet the results correspond directly to the abatement of Ebola in the country. The result is almost double what one would expect from a simple regression upon the means, indicating a high degree of variability amongst respondents.

Figure 3. rCSI by region in Guinea



Source: WFP mVAM

Continued stability in food prices in Liberia, and Sierra Leone compared with the previous months

In Liberia, food prices have been stable in country for the last 6 months; no meaningful or statistically significant change in prices was detected between the months of May and June. This trend is corroborated by market analysis by Building Markets (www.liberia.buildingmarkets.org). Aggregate prices in Sierra Leone have also held stable over the past 6 months. Between May and June, prices for imported and local rice did not change while palm oil prices rose slightly. The price for a litre of palm oil rose 3.3% for the month of June from 0.35 USD to 0.36 USD.**¹ The price increase was also statistically significant in Bo; Kenema; Kailahun & Kono; and Bombali, Koinadugu, and Tonkolili.**¹ The results are summarized in Table 1.

Table 1: Food price trends, Liberia and Sierra Leone, April – June

Area	April - May changes			May - June changes		
	Imported rice	Local rice	Palm oil	Imported rice	Local rice	Palm oil
Liberia	-1%	2%	1%	0%	0%	1%
Sierra Leone	2%	0%	-3%	-1%	2%	3%
Bo	-2%	-1%	5%	-2%	0%	4%
Bombali, Koinadugu, Tonkolili	0%	-2%	12%	2%	3%	6%
Kailahun, Kono	2%	-1%	4%	2%	-2%	6%
Kenema	13%	2%	0%	-5%	2%	5%

In Guinea, the average price of local rice was higher than that of imported rice at 0.50 vs 0.43 USD per kilogram. The average price of a half-litre of palm oil was 0.41 USD. For all commodities including imported rice, local rice, and palm oil, a subtle but statistically significant relationship exists between prices and geographical region.^{*** 4}

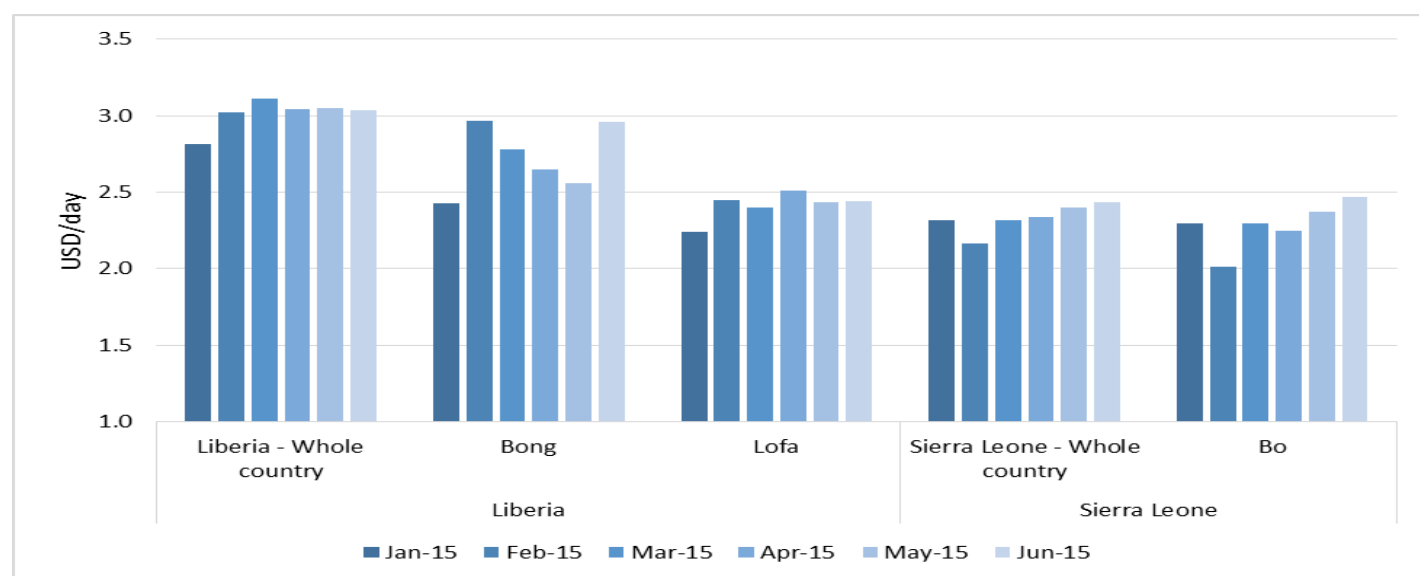
Rise in manual labour wages across Liberia and in Bo, Sierra Leone

Labour wages are important measures of food security as they contribute to understanding purchasing power. This is particularly relevant now in the period where lots of manual work is needed for agricultural activities such as field preparation. In Liberia, a statistically significant rise of 2%^{*** 5} was seen in daily wages for manual labour wages between May and June, though the major increase was in Bong where it was 17%.^{** 5} In Sierra Leone, the change in manual labour wages from May to June was not statistically significant at the national level although a 4% increase between the month of May and June was detected in Bo.^{*** 5}

Table 2: Food prices in Guinea - June

Area	June Prices (in USD)		
	Imported rice (kg)	Local rice (kg)	Palm oil (half-litre)
Guinea	0.43	0.50	0.41
Boke	0.42	0.50	0.40
Conakry	0.42	0.51	0.42
Faranah	0.43	0.51	0.40
Kankan	0.43	0.51	0.41
Kindia	0.42	0.51	0.41
Labe	0.43	0.49	0.42
Mamou	0.41	0.51	0.43
N'Zerekore	0.44	0.49	0.40

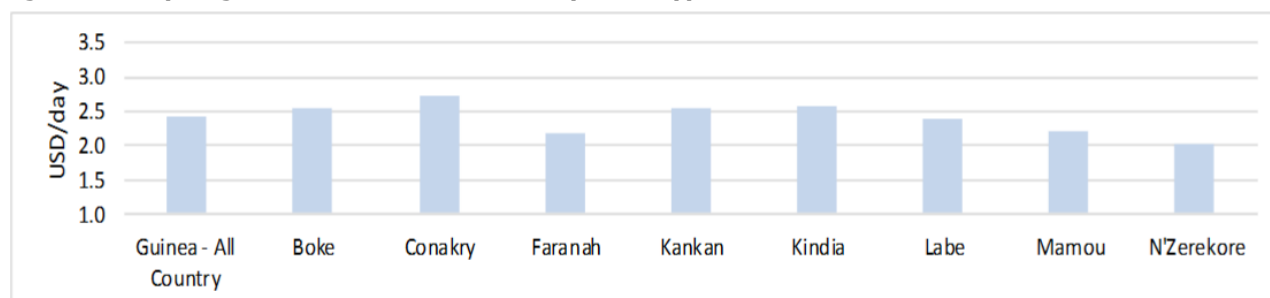
Figure 4: Daily wage rates for unskilled labour (USD/day), Liberia and Sierra Leone



Source: WFP mVAM

In Guinea, the national daily manual labour wage averaged 2.42 USD in June with a subtle but statistically significant variation in wages across regions.^{*** 4} The highest average daily was observed in Conakry and the lowest average daily wage was in N'Zerekore.

Figure 5: Daily wage rates for unskilled labour (USD/day) – Guinea



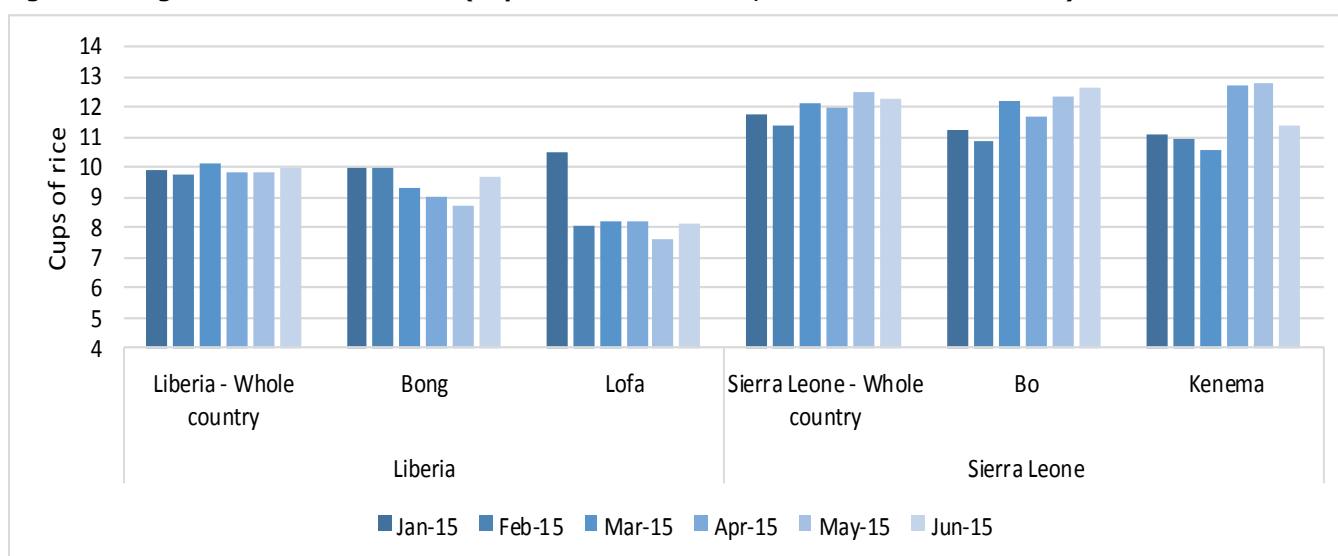
Source: WFP mVAM

Corresponding rise in terms of trade in Liberia and Sierra Leone

Terms of trade determine purchasing power and as reported here illustrate how much of food commodities individuals can barter for a day's worth of manual labor. In Liberia, terms of trade increased modestly nationwide. The terms for imported rice increased by 2%; by 3% for local rice and 1% for palm oil.^{** 5} The rises were in part driven by a substantial increase in Bong county where the terms of trade for imported rice increased by 10%; by 14% for local rice and by 15% for palm oil.^{** 5} Terms of trade also rose in Lofa County (by 7% for imported rice and 6% for local rice).^{** 5}

For Sierra Leone, changes in terms of trade were significant for several districts including Bo County, where they rose by 5.6% for imported rice and 2.3% for local rice.^{*** 5} In Kenema District terms of trade for palm oil decreased by 10%.^{** 5}

Figure 6: Wage-to-rice terms of trade (imported rice in Liberia, local rice in Sierra Leone)



Source: WFP mVAM

In Guinea, wage-to-imported-rice terms of trade averaged 5.9 while wage-to-local-rice terms of trade was 5.0. Terms for a half liter of palm oil averaged 6.1. As expected, a statistically significant relationship exists between terms of trade of all commodities and geographic region.^{*** 4} The adjacent table shows terms of trade for commodities by administrative region in Guinea.

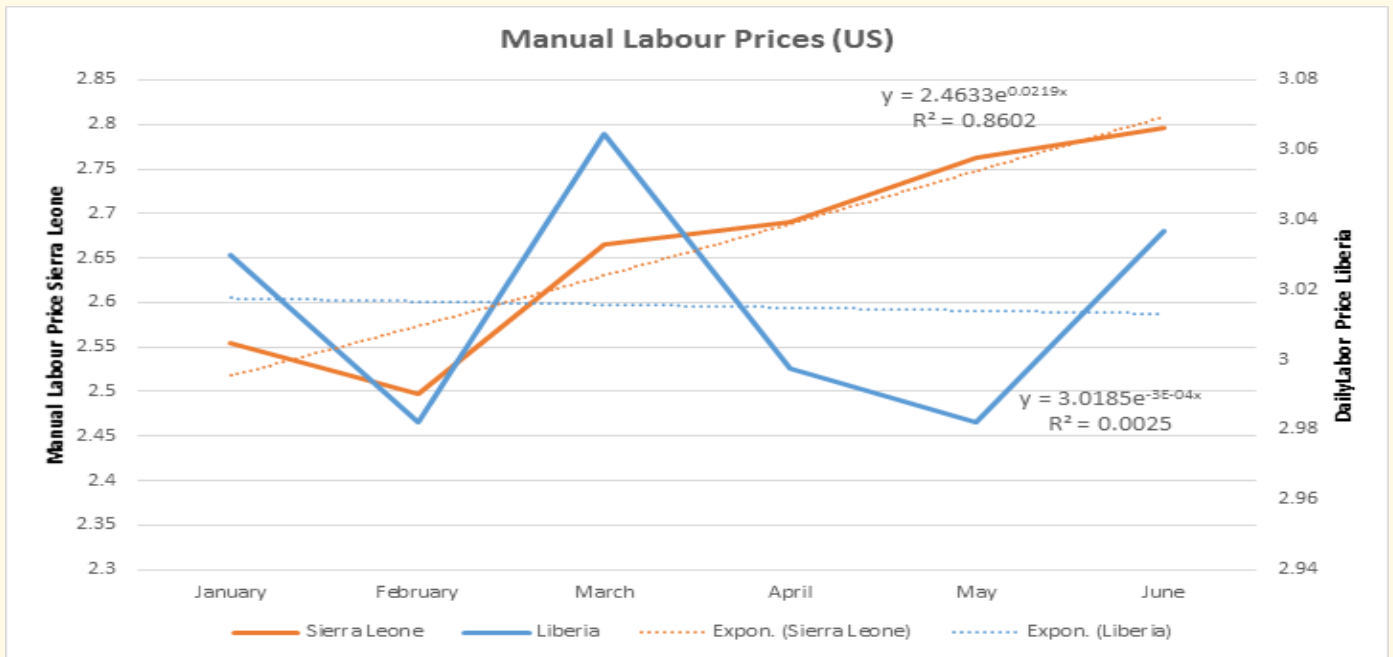
Table 3: Terms of trade by commodity and region – Guinea

Area	June Wage-to-commodity terms of trade		
	Imported rice (kg)	Local rice (kg)	Palm oil (half-litre)
Guinea	5.9	5.0	6.1
Boke	6.1	5.2	6.7
Conakry	6.8	5.5	6.9
Faranah	5.3	4.5	5.6
Kankan	6.2	5.1	6.2
Kindia	6.2	5.3	6.6
Labe	5.9	5.3	5.9
Mamou	5.7	4.3	5.5
N'Zerekore	4.7	4.2	5.3

How trends in wage labour rates affect household food security

Labour markets have been an integral part of the recovery, and we have monitored wage rates on a monthly basis. A simple regression on the cross-sectional means reveal a 2.2% monthly increase in manual labour rates in Sierra Leone and 0% change in Liberia (depicted in figure 7 below).

Figure 7: Liberia and Sierra Leone Daily Labour Prices by Month for 2015



Source: WFP mVAM

The fully specified models had respective R^2 values of 0.50 and 0.64 for Sierra Leone and Liberia, denoting the amount of variance they are able to explain. The estimates show that on average manual labour wages have experienced a month-on-month improvement of 2.5% since January 2015 within a 95% confidence interval of 1.4% to 3.6%.*** Likewise for Liberia, the model estimated a 0% improvement in wage rates over the period. These results corroborate entirely with the simple cross sectional models depicted in figure 7.

Given that prior to June the increase in manual labour prices coincided impeccably with the decrease in rCSI, we also examined the relationship between the two. The result showed that manual labour rates are indeed significant with an estimated effect of -0.11, i.e. for a 10% increase in manual labour prices we would expect a 1.04% decrease in rCSI.*** The result illustrates that while manual labour wages are a contributory factor, there are other factors contributing to food insecurity.

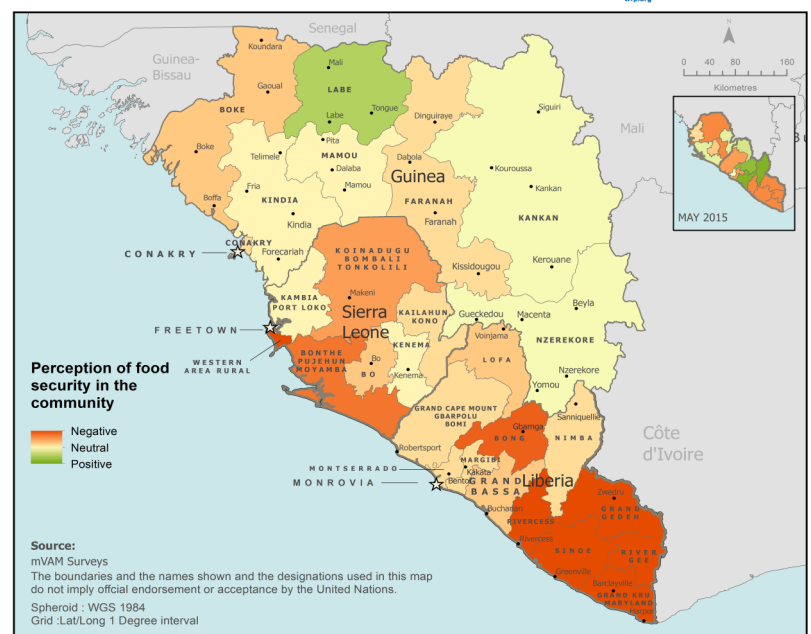
Perceptions of food security in June

At the end of the questionnaire, participants are asked an open-ended question, "Tell us about the food situation in your community." To analyze these responses and gauge perceptions of food security in June, we used the Pattern sentiment analysis algorithm developed by the [Computational Linguistics and Psycholinguistics Centre at the University of Antwerp](#). For a given sentence, the algorithm returns the 'polarity': a measure of how positive/negative the statement is on a scale of -1.0 to +1.0.

Compared with May, the mean polarity shifted negatively by 0.037 and 0.012 points respectively for both Liberia and Sierra Leone. For Liberia the change was statistically significant*¹, denoting that more negative responses were received in June, particularly in Bong**¹ (which partially reflected the rCSI trend) and Nimba.*¹

Figure 8: Mean sentiment values of food security in the community

GUINEA, LIBERIA, SIERRA LEONE - Perception of food security in the community
JUNE 2015



Source: WFP mVAM

The same analysis in Sierra Leone reveals only a statistically significant decrease in sentiment* ¹ in the agglomeration of Bonthe, Moyamba, and Pujehun districts.* ¹ Though this area did not exhibit any significant change in mean rCSI, it did show a 7% increase in the prevalence of negative coping for the month of June that was also significant at the 10% level.* ¹

Surprisingly in Guinea sentiment values are on average higher than they are in Liberia and Sierra Leone in spite of significantly higher coping levels. The region with the highest sentiment amongst all countries surveyed, Labe District in Guinea, also had the lowest rCSI values in all of Guinea.

For Sierra Leone the word "expensive" was the most frequently mentioned followed by "difficult" and "Ebola", while in Liberia and Guinea, Ebola was mentioned rarely. In fact 'Ebola' was ranked 24 in Liberia in June, mentioned 37% less frequently than in May, reflecting the absence of cases in the country until mid-June.

In Liberia 'road' was mentioned twice the number of times it was in May while 'season' was mentioned three times more frequently. Furthermore, negative words such as 'bad', 'hard', 'expensive' or 'difficult' were used 12% more frequently than in May. This confirms a fall in confidence and increasing concern about road inaccessibility in the rainy season. People using bush latrines used "money" and "expensive" twice as many times as those using their own flush latrines, underlining the economic vulnerability of poorer people.

In Guinea 'lack' and 'price' were the most frequently mentioned words. 'Good' was the third most mentioned, closely followed by "difficult", reflecting mixed food security perceptions. As no data was collected in Guinea in May, we are not able to offer a comparison of changes in sentiment in this bulletin.

Figure 9: Word cloud for Sierra Leone

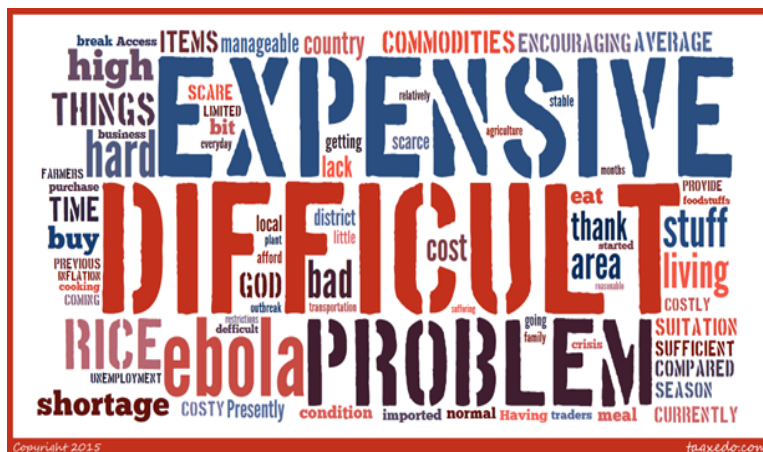


Figure 10: Word cloud for Liberia



Figure 11: Word cloud for Guinea



Conclusions and Outlook

After months of sustained improvement, the coping strategies index deteriorated in Liberia and did not improve in Sierra Leone this reporting month. Households who had been better off are now engaging in coping strategies to secure access to food.

While food prices and labour rates were relatively stable in June, the identification of new Ebola cases in Liberia in late June has led to new restrictions on movement, and might have an impact on trade and labour opportunities in affected communities. Deteriorating road access, continuing Ebola transmissions and effects of the lean season are identified as the major risk factors for food security in coming months.

Methodological Notes

Reporting statistical tests and significance level

Except where explicitly indicated, only statistically significant results are reported. To report the level of statistical significance, the following reference is used:

p-value	reported symbol
0.10 to 0.05	*
< 0.05 to 0.01	**
< 0.01	***

Correspondingly, the type of statistical test is also reported in superscript after the level of statistical significance. The following indicates the type of test referenced in the text:

1. Welch's t-test
2. Mc-Nemar (Paired χ^2) Test
3. Mann-Whitney Test
4. ANOVA
5. Paired t-test

Methodological notes on the econometric analysis of wage rates and the rCSI

As with many similar longitudinal surveys, attrition is a problem and a potential source of bias. For high earners, the incentives offered are often not sufficient to maintain interest, and amongst the low earners, mobile access issues and domestic migration make them difficult to reach repeatedly. To control for this bias we mirrored the regression model used for rCSI trend analysis in the previous bulletin. The regression model controlled for dynamics arising from toilet type, fixed effects by district, and random effects of the respondents themselves, with the log of manual labour price as the dependent variable in the regression. The dataset contained at least three months of observations for 1112 of 2283 unique respondents for Liberia (48.7%) and 1225 of 2003 unique respondents for Sierra Leone (61.2%).

For the purpose of analysing the relationship between wage rates and the rCSI, we utilized the Mundlak random effects regression model (Mundlak, Yair. 1978a. Pooling of time-series and cross-section data. *Econometrica*, 46(1): 69-85) as it can control for omitted variables while still using a random effects framework which is important to minimize bias due to attrition. Similar to the previous model, independent variables comprised the log of manual labour prices, toilet type, fixed effects by district, and random effects of the respondents themselves, with the log of rCSI as the dependent variable in the regression.

Currency conversions

For comparability, prices and wages in national currency are converted into US Dollars using historical exchange rates (<http://www.oanda.com/currency/historical-rates/>). For any month, the exchange rate on the last day of the month is used for determining the exchange rate.



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To download mVAM data on the Ebola-affected countries, please visit: http://vam.wfp.org/sites/mvam_monitoring/Ebola.html