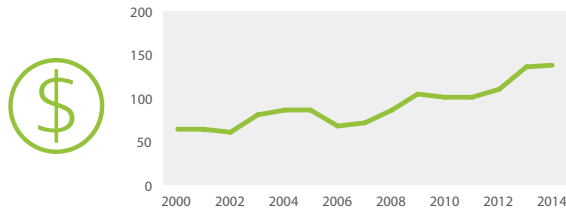


# GHANA

Nienke Beintema, George Essegbey, and Roland Asare

## AGRICULTURAL RESEARCH SPENDING



Million cedis  
(2011 constant prices)

GHANA  
**138.1**

Million PPP dollars  
(2011 constant prices)

GHANA  
**197.4**

KENYA

274.1

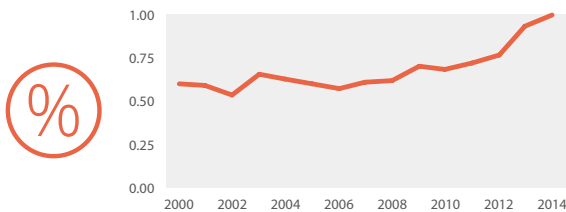
CÔTE D'IVOIRE

80.0

SENEGAL

51.3

## SPENDING INTENSITY



Agricultural research  
spending as a share  
of AgGDP

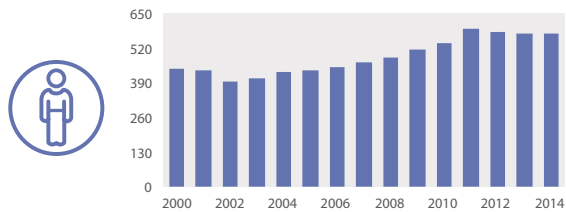
GHANA  
**0.99%**

KENYA  
0.79%

CÔTE D'IVOIRE  
0.52%

SENEGAL  
1.15%

## AGRICULTURAL RESEARCHERS



Full-time  
equivalents

GHANA  
**575.0**

KENYA  
1,178.5

CÔTE D'IVOIRE  
256.3

SENEGAL  
124.4

Share of researchers with  
MSc and PhD degrees

GHANA  
**95%**

KENYA  
80%

CÔTE D'IVOIRE  
99%

SENEGAL  
100%

Notes: Data above are for 2014. Research conducted by the private for-profit sector is excluded from this factsheet due to lack of available data. Information on access to further resources, data procedures and methodologies, and acronyms and definitions are provided on Page 4. See [www.asti.cgiar.org/Ghana/directory](http://www.asti.cgiar.org/Ghana/directory) for an overview of Ghana's agricultural R&D agencies.



### Spending growth

Growth in agricultural research spending during 2000–2011 mostly stemmed from increased capacity at Ghana's universities, whereas growth during 2011–2014 primarily resulted from salary increases at CSIR to institute parity with the higher education sector. Despite the increased spending, total agricultural researcher numbers actually contracted slightly during 2011–2014, mainly among researchers with BSc and MSc degrees.



### Donor-driven research agenda

Since 2000, actual government funding to CSIR has been well below approved budgets. Government funding barely covers salary costs, leaving CSIR almost entirely dependent on (volatile) donor and development bank funding to finance research activities. Given that donors and development bank priorities often override national priorities, high donor dependency can potentially lead to imbalances in CSIR's research agenda.



### Staffing challenges at CSIR

The 2012 salary increases successfully curtained high staff turnover within CSIR, but the high share of researchers in the older age brackets, and especially among those with PhD degrees, is an area of serious concern at CSIR and within the higher education agencies. Training opportunities are limited, although CSIR has instituted a system whereby senior researchers mentor their younger colleagues. Developing sound training and succession plans will be key to filling existing and anticipated staffing gaps at CSIR.

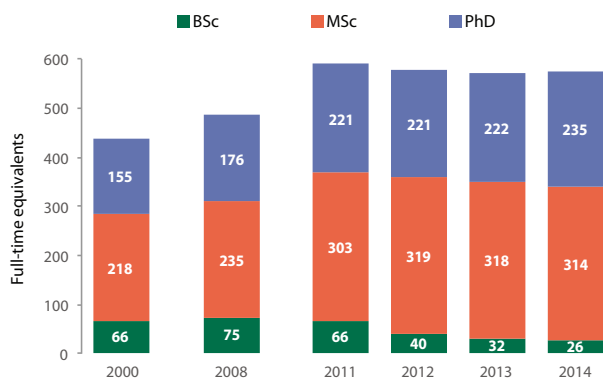


### Capital investments needed

Capital investments are totally inadequate at CSIR. Although government funding was allocated, no disbursements were made in 2010 and beyond to date. This obviously has serious repercussions for the council's infrastructure, including laboratory and office space, communications and scientific equipment, vehicles for field work, and so on. CRI was the only institute to receive funding for the construction of a biotechnology laboratory associated with its research on roots and tubers under WAAPP.

## Ghana's agricultural researchers by qualification level

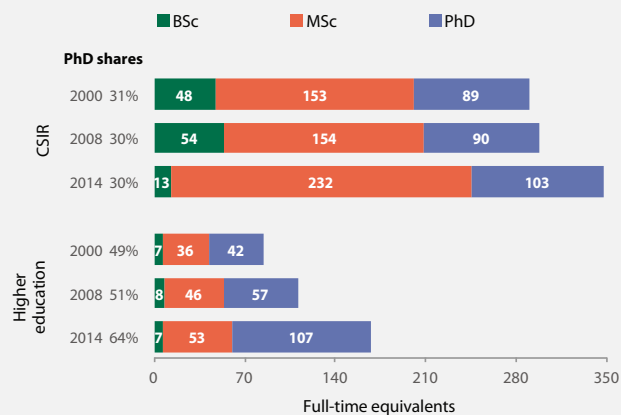
Following substantial increases in the number of MSc- and PhD-qualified researchers during 2000–2011, growth in both these categories halted. The number of researchers qualified to the BSc degree level peaked in 2008 but declined thereafter following a policy decision that researchers should hold at least a MSc degree.



Note: The government and higher education agencies employed a substantial number of technical support staff qualified to the BSc- and MSc- levels. These staff members do not have official researcher status.

## Ghana's agricultural researchers by sector and qualification level

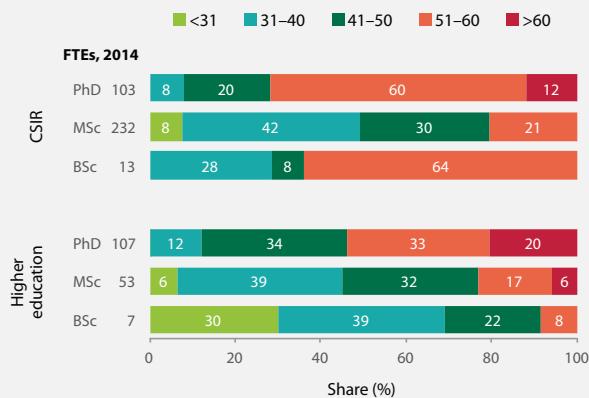
Although the higher education sector employs far fewer agricultural researchers (in FTEs), their numbers increased considerably over time, especially at the PhD level. As a result, during this period the number of PhD-qualified FTE researchers employed in the higher education sector surpassed the combined number employed at CSIR institutes.



Note: Figure excludes government agencies that are not part of CSIR.

## Ghana's agricultural researchers by age bracket

As of 2014, more than 70 percent of the PhD-qualified researchers employed within CSIR were in their 50s and 60s, whereas 54 percent fell into these age brackets at higher education agencies. These shares were comparable to those recorded in 2011 for both sectors.



Note: Figure excludes government agencies that are not part of CSIR.

## Ghana's share of female researchers

Overall, the share of female researchers rose from 17 percent in 2008 to 22 percent in 2014. The CSIR institutes employ relatively more women than the other government and higher education agencies. In general, as of 2014, female researchers were relatively younger and less well-qualified than their male colleagues.



### By qualification level, 2014

Qualification	Share (%)
BSc	17%
MSc	28%
PhD	14%

### By age bracket, 2014

Age Bracket	Share (%)
< 41	31%
41–50	24%
> 50	13%

## Ghana's MSc- and PhD-qualified agricultural researchers by discipline

As of 2014, Ghana employed around 55 plant breeders and geneticists with postgraduate degrees, representing 10 percent of the country's MSc- and PhD-qualified researchers. Approximately three-quarters of these researchers were employed within CSIR institutes. Socioeconomics and soil sciences were other strong disciplines (11 and 9 percent, respectively).

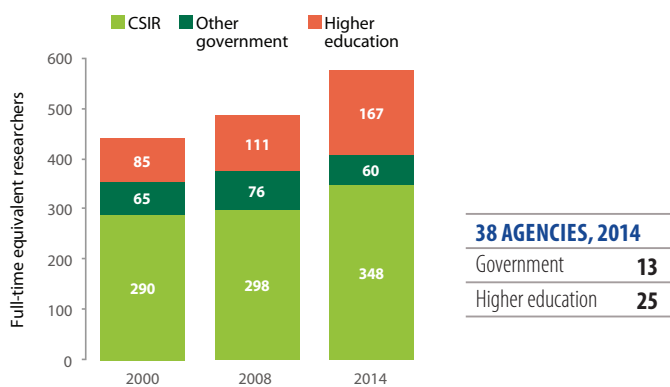
Agricultural researchers, 2014	FTEs		Share (%)	
	MSc	PhD	MSc	PhD
Plant breeding/genetics (incl. biotechnology)	34	22	11	9
Plant pathology	9	11	3	5
Plant physiology	6	6	2	2
Botany	2	7	1	3
Seed science and technology	7	1	2	1
Other crop sciences	26	15	8	6
Animal breeding/genetics	3	3	1	1
Animal husbandry	3	–	1	–
Animal nutrition	8	9	2	4
Dairy science	–	1	–	0.3
Poultry	2	5	1	2
Veterinary medicine	3	2	1	1
Zoology/entomology	15	17	5	7
Other animal and livestock	2	5	1	2

Agricultural researchers, 2014	FTEs		Share (%)	
	MSc	PhD	MSc	PhD
Forestry and agroforestry	9	5	3	2
Fisheries and aquatic resources	4	7	1	3
Soil sciences	26	24	8	10
Natural resources management	8	4	3	2
Water and irrigation management	6	2	2	1
Ecology	7	3	2	1
Biodiversity conservation	7	2	2	1
Food sciences and nutrition	14	8	4	3
Socioeconomics (incl. agricultural economics)	36	26	12	11
Extension and education	7	5	2	2
Other sciences	68	46	22	20
<b>Total</b>	<b>314</b>	<b>235</b>	<b>100</b>	<b>100</b>

Note: These are estimates based on an agency sample, representing 94 percent of the total number of FTE researchers.

## Institutional composition of Ghana's agricultural research

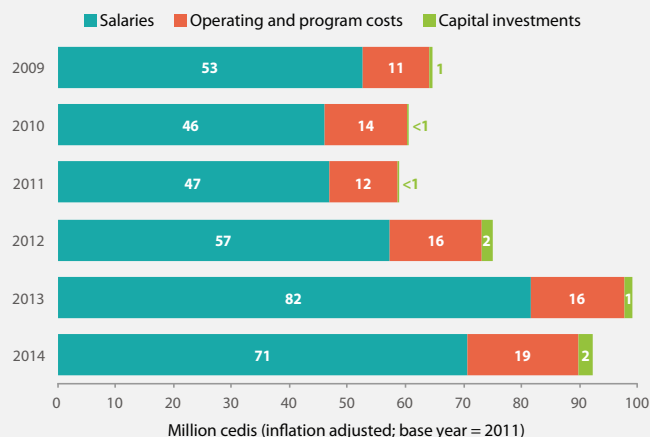
The institutional composition of agricultural research has changed little since 2000. Strong growth in the number of researchers employed in the higher education sector caused its share to rise from 19 percent in 2000 to 29 percent in 2014. Nevertheless, as of 2014, CSIR's 10 institutes still accounted for a combined 60 percent of the country's FTE researchers.



Note: CSIR comprises 10 research institutes.

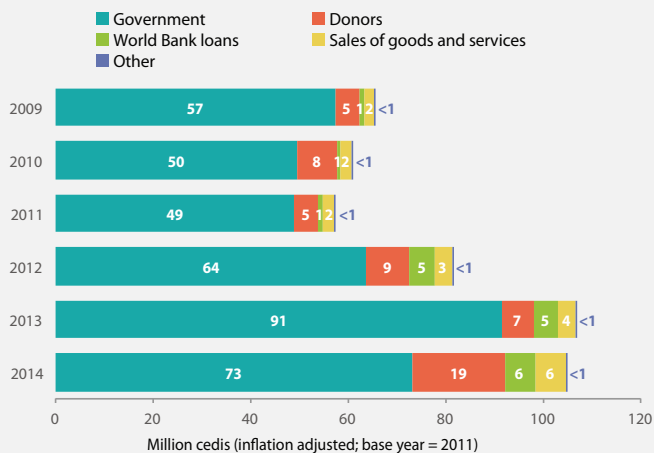
## CSIR's spending by cost category

On average, salaries and related expenses accounted for 77 percent of CSIR's total agricultural research spending during 2009–2014. Both the absolute level and share of total spending rose considerably due to salary increases instituted to achieve parity with salary levels offered to university-based researchers. Obviously this cost breakdown is significantly out of balance.



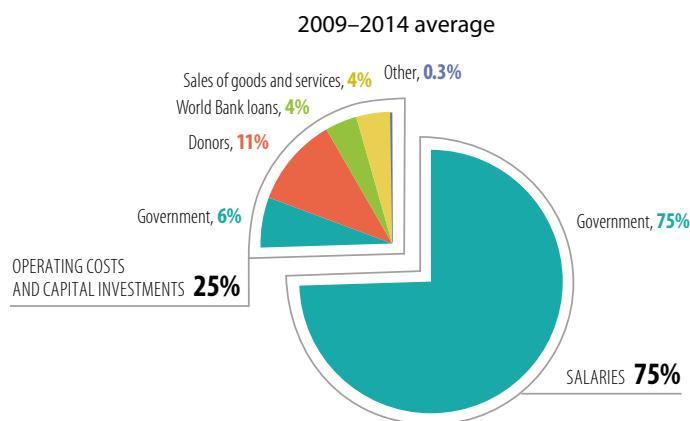
## CSIR's funding sources

CSIR institutes are primarily funded by the government, although donor contributions increased significantly in 2014 as a result of the World Bank-funded WAAPP. CRI, and to a lesser extent SRI, also received substantial funding for human and institutional capacity improvements through WAAPP.



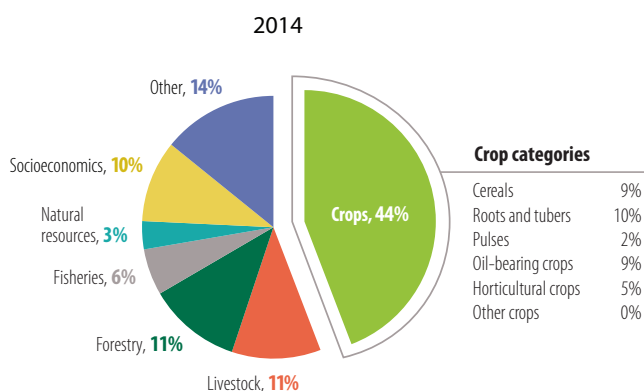
## CSIR's funding and spending compared

Although government support to CSIR has remained strong, it is only sufficient to cover salary-related costs, with little remaining to support operating costs and capital investments. As a result, the institutes are to a large extent dependent on donors and development banks to meet to the costs of their research activities.



## Ghana's agricultural researchers by area of focus

In 2014, 44 percent of the country's FTE researchers conducted crop research, whereas 11 percent (each) undertook livestock and forestry research. Major crops under investigation were the cereals maize, cassava, and rice, along with cocoa, yams, soybeans, vegetables, nuts, and oil palm.



## CSIR's recent peer-reviewed publications

CSIR published an average of 172 journal articles per year during 2012–2014, primarily in international journals. Publications per researcher averaged 0.5 per year.

Type	Number of publications, 2012–2014 annual average	
	CSIR	Per FTE researcher
Journal articles		
International	136.3	0.398
Regional	19.3	0.056
National	16.0	0.047
Books	3.7	0.011
Book chapters	4.7	0.014
<b>Total</b>	<b>180.0</b>	<b>0.526</b>

## Resources for Ghana

This factsheet presents recent data on the performance of agricultural research in Ghana, primarily focusing on key financial, human resource, institutional, and output indicators, while also highlighting relevant trends, challenges, and institutional changes. Additional resources are available at [www.asti.cgiar.org](http://www.asti.cgiar.org) and include:



ASTI's **interactive country page** for Ghana features national agricultural research investment and capacity data, a data exploration and download tool, as well as access to a variety of country publications.



ASTI's **benchmarking tool** allows key agricultural research indicators to be ranked and compared across African countries.



ASTI's **data download tool** provides access to more in-depth ASTI datasets and graphs for Ghana and many other countries.



ASTI's **agency directory** provides a view of agencies that conduct agricultural research in Ghana, along with their locations and key agency-level indicators.

The screenshot shows the ASTI website interface for Ghana. At the top, there are language options (français, español, contact) and the title 'ASTI led by IFPRI'. Below that is a navigation bar with 'Home', 'Data', 'Regions', 'Publications', 'Projects', 'News', 'Partners', 'About', and a 'Country Selector' dropdown. The main content area features a 'Country Factsheet' for Ghana, which includes a map of Africa with Ghana highlighted in blue. The factsheet is divided into three columns: 'Donor-driven research agenda', 'Staffing challenges at CSIR', and 'Capital investments needed'. The 'Donor-driven research agenda' section discusses government funding to CSIR. The 'Staffing challenges at CSIR' section mentions high staff turnover and the high share of researchers in the older age brackets. The 'Capital investments needed' section notes that capital investments are totally inadequate at CSIR. At the bottom of the factsheet, there are links for 'Key Indicators', 'Financial Resources', 'Human Resources', 'Research Focus', and 'Regional comparison'.

## ASTI Data Procedures and Methodologies

- ▶ The **data underlying this factsheet** were predominantly derived through primary surveys, although some data were drawn from secondary sources or were estimated.
- ▶ **Agricultural research** includes research conducted by the government, higher education, and nonprofit sectors; research conducted by the private for-profit sector is excluded due to lack of available data.
- ▶ ASTI bases its calculations of human resource and financial data on **full-time equivalent (FTE) researchers**, which take into account the proportion of time staff actually spend on research compared with other activities.
- ▶ ASTI presents its financial data in 2011 local currencies and **2011 purchasing power parity (PPP) dollars**. PPPs reflect the relative purchasing power of currencies more effectively than do standard exchange rates because they compare prices of a broader range of local—as opposed to internationally traded—goods and services.
- ▶ ASTI estimates the **higher education sector's research expenditures** because it is not possible to isolate them from the sector's other expenditures.
- ▶ Note that **decimal rounding** can cause totals to be one point higher or lower than the sum of their parts.



For more information on ASTI's data procedures and methodology, visit [www.asti.cgiar.org/methodology](http://www.asti.cgiar.org/methodology).

## Acronyms

AgGDP	agricultural gross domestic product
CRI	Crop Research Institute
CSIR	Council for Scientific and Industrial Research
FTE(s)	full-time equivalent(s)
PPP(s)	purchasing power parity (exchange rates)
R&D	research and development
STEPRI	Science and Technology Policy Research Institute
SRI	Soil Research Institute
WAAPP	West Africa Agricultural Productivity Program

## ABOUT ASTI, IFPRI, AND STEPRI

Working through collaborative alliances with numerous national and regional R&D agencies and international institutions, **Agricultural Science and Technology Indicators (ASTI)** is a comprehensive and trusted source of information on agricultural R&D systems across the developing world. ASTI is led by the **International Food Policy Research Institute (IFPRI)**, which—as a CGIAR member—provides evidence-based policy solutions to sustainably end hunger and malnutrition and reduce poverty. The **Science and Technology Policy Research Institute (STEPRI)** is one of 13 research agencies under the Council for Scientific and Industrial Research (CSIR). The institute provides key research support in the formulation of the country's socioeconomic development policy, specifically focusing on the promotion of innovation and the creation of an enabling environment for the effective use of science and technology.

ASTI/IFPRI and STEPRI gratefully acknowledge participating agricultural R&D agencies for their contributions to the data collection and preparation of this factsheet. ASTI also acknowledges the Bill & Melinda Gates Foundation and CGIAR Research Program on Policies, Institutions, and Markets for their generous support of ASTI's work in Africa south of the Sahara. This factsheet has been prepared as an ASTI output and has not been peer reviewed; any opinions are those of the authors and do not necessarily reflect the policies or opinions of IFPRI or STEPRI.