COLLABORATING TO DEVELOP AGRICULTURAL SKILLS

CAPACITY-BUILDING AGENCIES IN THE UNITED STATES OF AMERICA
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Published by
the Food and Agriculture Organization of the United Nations and the International Food Policy Research Institute
Rome, 2021
Abstract

Agriculture in the State of Mississippi is diverse. The industry employs nearly 29 percent of the state's population and has a farm-gate value (i.e. market value of products minus selling costs) of USD 7.45 billion. The focus of this case study is interagency collaboration in Mississippi rather than a single approach, agency, or organization. Represented agencies fit into four broad approaches to developing agriculture human capital among youth and adults: (i) formal education system; (ii) nonformal education system; (iii) state governmental agencies; and (iv) advocacy and commodity groups. These agencies (e.g. primary and secondary schools, universities, Extension, state agencies, organizations and groups) work both individually and collaboratively to provide education, resources and services to diverse clients, including youth, adults, farmers, ranchers, producers, families, schools, businesses, organizations, industries and communities. Success is conceptualized as a synergistic environment where highly effective individual agencies work together to produce a greater effect than one agency can create on its own, enhancing agriculture human capital and the agriculture industry as a whole.

Primary and secondary data collection and analysis documented individual agency outputs, outcomes and impacts as well as the role of interagency collaboration in agriculture human capital development. Secondary data were information from the represented agencies collected through their websites and annual reports. Primary data were collected through interviews with agency representatives and current or former clients. Thirteen interviews were completed via teleconference and audio-recorded to allow for complete transcription. Interviewees were primarily representatives of agricultural agencies (n=8) and women (n=9). Client interviewees were primarily past participants of youth development agencies (n=4).

Agency documents, representatives and clients described hard or technical skills, soft or functional skills built and resulting benefits, including increased agricultural productivity, reduced expenses, higher individual or farm income, networks linking farmers and other producers, a better prepared workforce and a strong agriculture industry with good economic returns. Agency representatives perceived that collaboration broadened expertise available to clients, leveraged complementary resources to meet diverse audience needs and created new initiatives. Recommendations for an interagency collaborative approach to developing agriculture human capital include: (i) individual agencies must be successful on their own at building agriculture human capital to be successful in interagency collaborations; (ii) agencies must have resources that are complementary to other agencies' resources; (iii) collaborative models can inform leaders and practitioners about characteristics for effective working relationships; and (iv) technology can provide a path for collaboration, discussion, market connections and technical support.
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Acknowledgements

This case study report was written as a part of the Agriculture Human Capital Investment Study funded by FAO Investment Centre and with the support of the International Food Policy Research Institute and the CGIAR Research Programme on Policies, Institutions and Markets (PIM) and the FAO Research and Extension Unit. Donna J. Peterson, PhD, and Laura H. Downey, DrPH, both with Mississippi State University (MSU) Extension, conducted interviews, analysed data, and wrote the report. Bryan C. Farrell, MPPA, with MSU's International Institute, conducted interviews and reviewed the report. Ashlyn Kiker, a graduate student in the School of Human Sciences at MSU, helped gather secondary data. Please contact the corresponding authors for questionnaires, data or any other questions. The report was developed with guidance and editorial support of Kristin Davis, Rachel Gilbert, Johanna Gammelgaard, Hlamalani Ngwenya and John Preissing.
### Abbreviations and acronym

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHCI</td>
<td>Agriculture Human Capital Investment</td>
</tr>
<tr>
<td>ATV</td>
<td>All-Terrain Vehicle</td>
</tr>
<tr>
<td>CGIAR</td>
<td>Commonwealth Group for International Agriculture Research</td>
</tr>
<tr>
<td>COVID-19</td>
<td>Corona Virus disease 2019</td>
</tr>
<tr>
<td>CTE</td>
<td>Career and Technical Education</td>
</tr>
<tr>
<td>DC</td>
<td>District of Columbia</td>
</tr>
<tr>
<td>ERS</td>
<td>Economic Research Service</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<tr>
<td>FFA</td>
<td>Future Farmers of America</td>
</tr>
<tr>
<td>FFS</td>
<td>Farmer field school</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GFRAS</td>
<td>Global Forum for Rural Advisory Services</td>
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<td>HCI</td>
<td>Human Capital Index</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>IFPRI</td>
<td>International Food Policy Research Institute</td>
</tr>
<tr>
<td>IRB</td>
<td>Institutional Review Board</td>
</tr>
<tr>
<td>LGU</td>
<td>Land-Grant University</td>
</tr>
<tr>
<td>MAFES</td>
<td>Mississippi Agricultural and Forestry Experiment Station</td>
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<tr>
<td>MDAC</td>
<td>Mississippi Department of Agriculture and Commerce</td>
</tr>
<tr>
<td>MDE</td>
<td>Mississippi Department of Education</td>
</tr>
<tr>
<td>MFB</td>
<td>Mississippi Farm Bureau Federation</td>
</tr>
<tr>
<td>MS</td>
<td>Mississippi</td>
</tr>
<tr>
<td>MSU</td>
<td>Mississippi State University</td>
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<tr>
<td>NASS</td>
<td>National Agricultural Statistics Service</td>
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<tr>
<td>PIM</td>
<td>Policies, Institutions and Markets</td>
</tr>
<tr>
<td>PPP</td>
<td>Purchasing Power Parity</td>
</tr>
<tr>
<td>RCU</td>
<td>Research and Curriculum Unit</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollar</td>
</tr>
<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
</tr>
</tbody>
</table>
Sustainable agricultural productivity, food security and poverty reduction remain top goals of governments and development institutions around the world. Progress is under threat from a variety of crises, including climate change and public health emergencies and their associated economic shocks. Along with a growing population and increased demand for agricultural goods for food, fuel and fibre, these concerns necessitate investments in agriculture, rural infrastructure, natural resource management and climate resilience.

Agricultural investments often emphasise the physical and financial capital of farming households, such as land, fertiliser or credit. However, agriculture human capital investment (AHCI) is crucial for spurring innovation, informing farm management decisions and empowering smallholders. Human capital is an economic term encompassing assets that increase individual productivity, such as education and health. For the purpose of this study, human capital is defined as the stock of habits, knowledge and social and personality attributes (including creativity) embodied in the ability to perform labour so as to produce economic value (Goldin, 2016). Human capital allows people to effectively utilise other types of capital. For example, farmers’ education and knowledge influences their ability to make decisions, adopt new technologies, evaluate risks and manage farm resources.

As part of a global study on promising AHCI initiatives, this case study presents evidence from multiple agencies and organizations in the State of Mississippi that work to build agriculture human capital. The global study, commissioned by the Food and Agriculture Organization (FAO) and led by the International Food Policy Research Institute (IFPRI) with support from the CGIAR Research Program on Policies, Institutions, and Markets (PIM) examines opportunities for both public and private investment in human capital in agriculture. This study aims to fill knowledge gaps about promising investments in programmes that develop agriculture human capital, particularly across different target groups such as smallholders, women and youth.
Case studies were selected according to a set of criteria following a broad assessment using literature review and expert input. Criteria included documentation of impact; scalability, replicability and institutionalization; inclusion and empowerment; holistic integration; and sustainability. Nine case studies were selected across geographies and from a typology of agriculture human capital. The selection process involved a series of workshops during which technical experts discussed potential cases, case study selection and case study teams.¹ This case study adds perspectives on how interagency collaboration in the State of Mississippi contributes to successful agriculture human capital development.

¹ For more information on this process and for a detailed description of the typology, please see Davis et al., 2020).
In 2019, the population of the United States of America was 328,239,523, with 17.5 percent considered rural (Table 1). Rural businesses and industries often focus on resource-based activities that include agriculture, forestry, mining, or natural amenity-based recreation (US Department of Agriculture Economic Research Service, 2020a). The land area of the United States of America reaches almost 2.3 billion acres, with approximately half of that land base used for agricultural purposes (US Department of Agriculture Economic Research Service, 2019). Farms contributed less than 1 percent to gross domestic product (GDP) in 2019, a figure that is relatively consistent over time (US Department of Agriculture Economic Research Service, 2020b). Agriculture and related industries provided 10.9 percent of employment in 2019 (US Department of Agriculture Economic Research Service, 2020b). On average, one US farm can feed 166 people around the world annually (American Farm Bureau Federation, 2020). Given predicted growth in the global population, farmers will need to grow more food than they do now. Building agriculture human capital is essential to meeting this need.

In 2019, the United States of America had 2,023,400 farms covering 897,400,000 acres. The average size of a farm was 444 acres (US Department of Agriculture National Agricultural Statistics Service, 2020a) and the average age of farmers was 57.5 years in 2017 (US Department of Agriculture National Agricultural Statistics Service, 2019a). Most farms (90 percent) were small family farms, defined as a farm in which a majority of the farm was owned by the operator and related individuals and had less than USD 350,000 in gross cash farm income. However, large-scale family farms (with gross cash farm income of USD 1 million or more), which comprised only 3 percent of farms, accounted for 46 percent of the value of production (US Department of Agriculture Economic Research Service, 2020c). In 2019, Mississippi had 34,500 farms, with an average size of 301 acres (US Department of Agriculture National Agricultural Statistics Service, 2020b), while catfish are raised on 34,700 water acres (Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine, 2019), and 95 percent of farms in Mississippi were classified as family farms (US Department of Agriculture National Agricultural Statistics Service, 2019b).
Agriculture human capital is influenced by multiple indicators, which create an enabling environment for knowledge and skills development. Some of these include general individual and community characteristics, educational attainment, information and communications technology (ICT) and agriculture-related funding (Table 1).

The poverty headcount ratio at USD 1.90 is 1.2 percent in the US, and the prevalence of undernourishment is 2.5 percent (World Bank, 2020a). In 2018, the US poverty line for a three-person family of two adults with one child was USD 20,212 or USD 18.5 per day per person (US Department of Agriculture Economic Research Service, 2020d). Based on this definition, in 2018, the average rural poverty rate in the US was 16.1 percent, while the urban poverty rate was 12.6 percent. Rates are higher in Mississippi, with a 2018 rural poverty rate of 22.7 percent and an urban poverty rate of 16.6 percent (US Department of Agriculture Economic Research Service, 2020e). Poverty is associated with several negative effects, including inadequate nutrition, food insecurity, lack of access to healthcare, poor academic achievement, school dropout, physical health problems, under-resourced schools and behavioural and socioemotional problems (American Psychological Association, n.d.), with each of these factors influencing human capital development.

Figure 1
Map of Mississippi (United States of America)
The United States of America has mandatory school attendance requirements for the minimum and maximum age required by states during which a young person must be enrolled in and attend school (National Center for Education Statistics, 2017). These requirements vary by state and range from a minimum of age 5 to a maximum of age 18 years. Expected years of school for males and females are therefore 12.8 and 12.9 years, respectively, with a 98.8 percent completion rate. The literacy rate for adults aged 16 to 65 years is 79 percent (US Department of Education, 2019). The Human Capital Index (HCI) represents “the productivity of the next generation of workers compared to a benchmark of complete education and full health” (World Bank, 2020c). An HCI score can range from 0 to 1, with 1 suggesting that a child born today can expect to achieve full health (100 percent adult survival and no stunting) as well as full education potential (14 years of high-quality schooling by age 18). The Human Capital Index for the US (0.70) is lower than the average for North America (0.75) and equal to the average for high-income countries, indicating that the work productivity of a child born today is 30 percent below what that child could have achieved with full health and education (World Bank, 2020b).

In 2020, Mississippi is ranked 49th overall out of the 50 states on four key indicators of child well-being: (i) economic well-being (e.g. poverty, no parent with full-time employment); (ii) education (e.g. maths achievement level, reading achievement level, young children not in school); (iii) health (e.g. low birth-weight babies, child and teen death rate, obesity); and (iv) family and community (e.g. children in single-parent families, births to teenagers) (Annie E. Casey Foundation, 2020). Education is an important factor in future success and well-being. School attendance is required from age 6 to 17 in Mississippi, with continued education available beyond that stage. High school consists of four years of education, with graduation rates calculated based on completion of specific requirements within four years with a regular diploma (Hussar et al., 2020). The public high school four-year graduation rate for the 2017–2018 school year was 84 percent in Mississippi (Vanderford, 2020) compared to 85 percent for the US (Hussar et al., 2020). The literacy rate in Mississippi is 84 percent (World Population Review, 2020). While it is encouraging that the high school graduation rate in Mississippi is similar to the national average, improvement is needed in other key areas to enhance human capital development.

Access to information and communications technologies is widespread in the US. All residents have access to electricity (World Bank, 2020a). Mobile subscriptions are 129 per 100 people (i.e. some people have multiple subscriptions) (World Bank, 2020a), and 80 percent of the population has internet access (US Census Bureau, 2019a). Mississippi has the lowest rate of broadband (high-speed internet) coverage in the US, with only 68 percent of residents having a broadband internet subscription (US Census Bureau, 2019b). Other technology advances such as temperature and moisture sensors, aerial images, unmanned aerial vehicles, robotic systems, GPS technology and precision agriculture have enabled US farm operations to increase safety, efficiency and profitability while being more environmentally friendly (US Department of Agriculture National Institute of Food and Agriculture, n.d.). The average age of principal farm operators in Mississippi is 59 years, with 34 percent aged 65 or older (US Department of Agriculture National Agricultural Statistics Service, 2019a). Given that older adults are slower or less likely to adopt new technologies, Mississippi faces a potential challenge in this area.
The United States of America also has national policies to support the agriculture industry. The Office of Agricultural Policy deals with foreign markets for US farm products, regulatory systems, trade barriers around the world, consumer and food safety and animal and human health (US Department of State, 2020). The Agricultural Improvement Act, known as the Farm Bill, governs agricultural and food programmes, such as farm commodity revenue support, US nutrition assistance, trade and foreign food assistance, farm credit, research, rural development and agricultural conservation for a five-year period, currently 2018–2023 (Congressional Research Service, 2019a). While the Farm Bill funds programmes that may be outside the purview of direct agriculture investment and additional spending measures may include funds directly tied to agriculture, Farm Bill outlays for 2018–2023 are budgeted at USD 428 billion (Congressional Research Service, 2019b). In Mississippi, the Department of Agriculture and Commerce regulates the agriculture industry within the state and promotes Mississippi's agricultural products (Mississippi Department of Agriculture and Commerce, 2020a). Policies at local, state, national, and international levels both influence and are a result of various agricultural activities.

Funding for agricultural research in the United States of America comes from many sources. Although in the previous Farm Bill for 2014–2018, less than one percent of its funds were spent on agricultural research and development (Flowers, 2018), federal and non-federal funding (e.g. state appropriations, local governments, self-generating funds from sale of products, industrial organization or commodity grants and professional societies) for agricultural research totalled USD 4.7 billion in 2017 (US Department of Agriculture National Institute of Food and Agriculture, 2020). The Mississippi state government recommended that approximately 1.4 percent of its total budget be used for agriculture-related expenditures in 2020 (State of Mississippi, 2020). Funding from federal and non-federal sources for agricultural research in 2017 was USD 175.3 million (US Department of Agriculture National Institute of Food and Agriculture, 2020). Research and innovations in areas such as animal and crop genetics, chemicals, equipment and farm organization have increased agricultural productivity. Farming is often viewed as hard work with little monetary reward, so new techniques that increase efficiency and productivity and decrease costs may help attract new individuals to the farming industry.

AGRICULTURAL LANDSCAPE IN MISSISSIPPI

In 2019, Mississippi’s population was 2 976 149 (0.9 percent of the total US population), with 51 percent considered rural (Table 1). Mississippi has 10.4 million acres of farmland, nearly 20 million forest acres, 14 000 miles of streams and 640 000 acres of ponds and lakes (Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine, 2019). Agriculture in Mississippi is very diverse; the seven leading agriculture commodities are poultry, forestry, soybeans, cotton, corn, cattle and calves, and catfish. The industry employs nearly 29 percent of the state’s population and has a farmgate value (i.e. market value of products minus selling costs) of USD 7.45 billion. Agriculture and forestry production contribute an additional USD 16.2 billion to the economy in value-added agriculture.
Nearly 57 percent of farms in Mississippi had economic sales in the range between USD 1000 and USD 9999, with an additional 31 percent between USD 10 000 and USD 99 999 (US Department of Agriculture National Agricultural Statistics Service, 2020a). The average net cash farm income of USD 63 733 per farm in 2017 was higher than the US average of USD 43 053 (US Department of Agriculture National Agricultural Statistics Service, 2019c). However, only 42.3 percent of Mississippi farms reported net gains (after accounting for expenditures) in 2017, with over half of farms reporting a net loss of nearly USD 16 000 on average (US Department of Agriculture National Agricultural Statistics Service, 2019c).

Mississippi’s workforce participation rate of 55 percent is one of the lowest in the United States of America (State Workforce Investment Board, 2018), and demand for agriculture-related jobs in the state greatly exceeds the number of individuals with the appropriate education and training for such jobs (Parisi, 2018). Individuals are not taking jobs in the agriculture industry and are not acquiring training, certifications or credentials, or the work-ready skills that agriculture industries desire in prospective employees. Given the discrepancy in demand relative to supply, combined with the average age of Mississippi farmers, the state is facing an agriculture job crisis. With the diversity of agriculture in the state (e.g. livestock, crops, catfish, forestry), opportunities to develop agriculture human capital must come through multiple approaches, including formal and nonformal education provision, youth organizations, government agencies and advocacy groups to reach diverse audiences. This case study describes key state-wide agencies that work individually and together to build such capacity.
Table 1
Key agricultural, human capital and enabling environment indicators in Mississippi and the United States of America

<table>
<thead>
<tr>
<th>Indicator category</th>
<th>Indicator name</th>
<th>Latest data available</th>
<th>Indicator value for United States of America</th>
<th>Indicator value for Mississippi</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Total population</td>
<td>2019</td>
<td>328 239 523</td>
<td>2 976 149</td>
</tr>
<tr>
<td></td>
<td>Rural population (% of total population)</td>
<td>2019</td>
<td>17.5</td>
<td>5b</td>
</tr>
<tr>
<td></td>
<td>Number of smallholder or family farmers (%)</td>
<td>2018 (US) 2017 (MS)</td>
<td>90b</td>
<td>95c</td>
</tr>
<tr>
<td></td>
<td>Poverty headcount ratio at USD 1.90 (%)</td>
<td>2016</td>
<td>1.2</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Prevalence of undernourishment (%)</td>
<td>2017</td>
<td>3</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Human Capital Index (HCI) score</td>
<td>2020</td>
<td>0.7</td>
<td>–</td>
</tr>
<tr>
<td>Enabling environment: educational attainment</td>
<td>Expected years of schooling (male and female)</td>
<td>2020</td>
<td>Male = 12.8 Female = 12.9</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Primary completion rate, total</td>
<td>2017</td>
<td>98.8</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Literacy rate, adults age 16–65, total</td>
<td>2019</td>
<td>79d</td>
<td>84e</td>
</tr>
<tr>
<td></td>
<td>National agricultural research expenditure</td>
<td>2017</td>
<td>USD 4.7 billion</td>
<td>USD 175.3 million f</td>
</tr>
<tr>
<td></td>
<td>Agriculture expenditure</td>
<td>2019 (US) 2020 (MS)</td>
<td>USD 102 billion</td>
<td>USD 288.7 million h</td>
</tr>
<tr>
<td>Enabling environment: funding</td>
<td>Mobile subscriptions per 100 people</td>
<td>2018</td>
<td>129</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Secure internet servers</td>
<td>2019</td>
<td>40 706 354</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Access to high-speed internet (% of population)</td>
<td>2018</td>
<td>80.4a</td>
<td>68.0a</td>
</tr>
<tr>
<td></td>
<td>Access of electricity (% of population)</td>
<td>2018</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Enabling environment: ICT-related indicators</td>
<td>National Agriculture Investment Plan or Policy in place</td>
<td>2020</td>
<td>Yes</td>
<td>–</td>
</tr>
</tbody>
</table>

NOTE: The poverty headcount ratio indicates the percentage of the population living on less than USD 1.90 per person per day in 2011 PPP.

SOURCES: All statistics are taken from the World Bank Data website (World Bank, 2020a) unless otherwise indicated by superscript letters: a US Census Bureau (2019b); b US Department of Agriculture Economic Research Service (2020); c US Department of Agriculture National Agricultural Statistics Service (2020b); d US Department of Education (2019); e World Population Review (2020); f US Department of Agriculture National Institute of Food and Agriculture (2020); g Congressional Research Service (2019b); h State of Mississippi (2020).
Chapter 2
Overview of the case study

The focus of this case study is interagency collaboration in Mississippi based not on a single approach, agency or organization, but on a range of agencies that fit into four broad approaches to developing agriculture human capital among youth and adults. The project team conceptualized collaboration as “a process through which parties who see different aspects of a problem can explore constructively their differences and search for solutions that go beyond their own limited vision of what is possible” (Gray, 1989, p. 5).

The four broad approaches are:
• the formal education system
• the nonformal education system
• state governmental agencies
• advocacy and commodity groups.

In this study, the term “agency” is used as a general term to refer to any entity that has a role in building agriculture human capital (e.g. primary and secondary schools, universities, nonformal education entities, state agencies, youth organizations, advocacy organizations, and commodity groups). Agencies within the four broad approaches deliver formal and nonformal education and resources and services to a wide range of diverse clients. These clients include Mississippi youth, adults, farmers, ranchers, producers, families, schools, businesses, agencies, organizations, industries and communities. The United States of America has a collection of federal (central) government agencies such as the US Department of Agriculture (USDA) that manage regulation, provide some support and may collaborate with Mississippi organizations, agencies and clients. This case will focus specifically and exclusively on those entities within Mississippi.

TYPES AND AREAS OF HUMAN CAPITAL ENHANCED
The agencies represented in this case study enhance various types of human capital. The efforts described in this case study do not relate to a particular value chain, commodity, or enterprise but include many diverse areas in agriculture such as row crops, livestock, aquaculture, forestry, horticulture, sustainable agriculture, agriculture pests and diseases and technology. The agencies included in this case study reach all Mississippi residents (males and females, youth and adults) through individual or group education.
Table 2
Broad approaches to agriculture human capital development in Mississippi

<table>
<thead>
<tr>
<th>Approach</th>
<th>Primary general audience served</th>
<th>Exemplar agencies</th>
<th>Types of human capital enhanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal public education system</td>
<td>Youth (group) female/male</td>
<td>Public schools, Kindergarten to 12th grade</td>
<td>· Technical skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Empowerment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· 21st-century skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Lifelong learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Certification programmes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Future Farmers of America (FFA)</td>
<td>· Technical skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Empowerment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· 21st-century skills</td>
</tr>
<tr>
<td>Adult (group) female/male</td>
<td>Secondary career and technical public education (two-year) colleges</td>
<td>Land-grant universities (four-year) – Mississippi State University and Alcorn State University</td>
<td>· Technical skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Managerial skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· 21st-century skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Lifelong learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Certification programmes</td>
</tr>
<tr>
<td>Nonformal education system</td>
<td>Youth (group) female/male</td>
<td>4-H</td>
<td>· Technical skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Empowerment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· 21st-century skills</td>
</tr>
<tr>
<td>Adult (individual and group) female/male</td>
<td>Cooperative Extension</td>
<td></td>
<td>· Technical skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Empowerment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Managerial</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· 21st-century skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Lifelong learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Certification programmes</td>
</tr>
<tr>
<td>State governmental agencies promoting and supporting agriculture</td>
<td>Adult (group) female/male</td>
<td>Mississippi Department of Agriculture and Commerce</td>
<td>· Technical skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Empowerment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· 21st-century skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Lifelong learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Certification programmes</td>
</tr>
<tr>
<td>State advocacy and commodity groups</td>
<td>Adult (group) female/male</td>
<td>Farm Bureau Federation</td>
<td>· Empowerment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· 21st-century skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· Lifelong learning</td>
</tr>
</tbody>
</table>

SOURCES: Authors' own elaboration.
**HISTORICAL PERSPECTIVE**

As described in a previous section, the viability of agriculture in Mississippi is a result of over 150 years of federal, state, and local support for agricultural endeavours in the state. While a complete historical account is beyond the scope of this case study, essential efforts by the US federal government are briefly highlighted before more detailed descriptions of the agencies represented in this case study are presented.

Much of Mississippi’s agricultural progress is due in part to four federal legislative acts that prepared the way for a system of continuous improvement. The following three federal legislative acts, passed by the US Congress, significantly strengthened the public university system as related to agriculture discovery and education, and resulted in the ability to diffuse knowledge and practices to the people of each state in the country. These three legislative acts (Morrill; Hatch; Smith–Lever) led to the three-part focus of land-grant colleges and universities (LGUs): teaching, research, and Cooperative Extension System (Cooperative Extension). A fourth federal legislative act, Smith–Hughes, supported training teachers in vocational education and paved the way for an agriculture-related youth organization through the formal education system. Table 3 provides key details on federal legislation that defined and still influences today’s development of human capital in agriculture. Federal, state, and local government support undergirds the current system of interagency collaboration that contributes to the development of agriculture human capital in Mississippi.

<table>
<thead>
<tr>
<th>Year</th>
<th>Federal legislation</th>
<th>Purpose</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1862</td>
<td>Morrill Act</td>
<td>Development of a national land-grant system of colleges and universities specializing in agriculture and the mechanical arts in each state (Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine, 2020).</td>
<td>Provided each state with public lands that could be sold or used for profit to establish at least one college that could teach agricultural and mechanical sciences (National Research Council, 1995).</td>
</tr>
<tr>
<td>1887</td>
<td>Hatch Act</td>
<td>Development of the Agricultural Experiment Stations for the purpose of conducting applied research and discovery.</td>
<td>Helped agricultural producers remain viable and competitive in a global economy and provide a safe food supply (Mississippi State University, 2001).</td>
</tr>
<tr>
<td>1914</td>
<td>Smith–Lever Act</td>
<td>Development of the Cooperative Extension System as a partnership between the federal government and LGUs. State legislation allowed for local governments to become a third partner in Cooperative Extension efforts.</td>
<td>Diffused agricultural-related knowledge and practices through off-campus nonformal education.</td>
</tr>
<tr>
<td>1917</td>
<td>Smith–Hughes Act</td>
<td>Support for training teachers in vocational education.</td>
<td>Paved the way for an agriculture-related youth organization through the formal education system.</td>
</tr>
</tbody>
</table>

SOURCE: Authors’ own elaboration.
AGENCIES REPRESENTED

Currently, collaborative work among various agencies continues to advance agriculture in the state. Annex 1 contains a description of major activities conducted by different agencies in Mississippi to build human agricultural capital. Some agencies described in this case study are unique to the United States of America. Two examples (as noted above) are Land-Grant Universities (LGU) and Cooperative Extension. Each US state and territory (as well as the District of Columbia) has one 1862 LGU, while some states have additional 1890 LGUs (historically black colleges and universities) and others have 1994 LGUs (federally recognized tribal colleges) (Association of Public and Land-Grant Universities, 2020). Mississippi has two LGUs. The first, Alcorn University, founded in 1871, was renamed Alcorn Agricultural and Mechanical College in 1878 as a result of the Morrill Act. Called Alcorn State University (ASU) since 1974, it is the oldest public, historically black, land-grant institution in the United States (Alcorn State University, 1994). In 1878, the second LGU in the state, Mississippi State University (MSU), was established with the name of Agricultural and Mechanical College of the State of Mississippi with a mission “to provide training in agriculture, horticulture and the mechanical arts ... without excluding other scientific and classical studies, including military tactics” (Mississippi State University, 2020). This mission represents the formal education focus of an LGU.

The Mississippi Agricultural and Forestry Experiment Station, as provided by the Hatch Act, supports applied research and discovery to help Mississippi's agricultural producers remain viable and competitive in a global economy and provide a safe food supply (Mississippi State University, 2001); this represents the research focus of an LGU. Research is conducted on university campuses, at off-campus stations (e.g. farms, greenhouses, technology, weather stations, bodies of water), and even directly on producers' lands to identify and disseminate effective practices and technologies for agriculture in the state. Current research falls into broad areas of animal production systems, food safety and quality, human health and well-being, plant production systems, sustainable communities, and sustainable energy (Mississippi Agricultural and Forestry Experiment Station, 2020). Research findings are disseminated through publications, websites, social media and nonformal education (often conducted in collaboration with MSU Extension).

As a result of the Smith–Lever Act, MSU Extension (Cooperative Extension) has been delivering research-based, nonformal education in all 82 counties of Mississippi for more than a century (Mississippi State University Extension Service, 2020), thus representing the Cooperative Extension focus of an LGU. Similarly, ASU Extension provides nonformal education in 15 of Mississippi's counties (Alcorn State University, n.d.). Cooperative Extension benefits from the formal teaching and research conducted at its LGU. Nonformal education provided by MSU and ASU Extension ranges from one-on-one technical assistance (e.g. via phone, email, on-farm visits), group educational programmes (e.g. face-to-face, videoconferencing, recorded presentations), formal certification programmes and informational materials (e.g. newsletters, pamphlets, social media, television and radio, publications, websites). Most of the nonformal education provided by MSU and ASU Extension is free; however, certification programmes or other activities may have associated monetary fees to cover the cost of assessments or materials.
4-H and Future Farmers of America (FFA) are two youth development organizations illustrated in this case study. Both focus on agriculture human capital development among youth audiences and have historically focused on experiential learning or learning-by-doing in agricultural-related disciplines. The four Hs in 4-H represent Head, Heart, Hands, and Health, and these are the values of the positive youth development organization. It started in 1902 as the Tomato Club or the Corn Growing Club in the State of Ohio and became part of the US Cooperative Extension System in 1924 (National 4-H Council, 2020a). Cooperative Extension professionals and trained volunteers deliver 4H programmes through school and community clubs, 4-H camps, and in-school and after-school programmes (National 4-H Council, 2020b). Thus, 4-H is considered part of the nonformal education system with programmatic activities informed by work at LGUs. Experiential learning occurs through projects (e.g. raising and exhibiting swine, growing vegetables, livestock judging, cooking, building robots), civic engagement (e.g. community service, leadership activities) and competitions.

The 1917 Smith–Hughes Act supported training teachers in vocational education and provided the opportunity for agriculture-related youth organizations through the formal education system (FFA). This legislation provided federal funding to states for secondary school instruction in agricultural and industrial trades as well as in home economics that would prepare individuals for industrial or commercial occupations without a need to attend college (Steffes, n.d.). Vocational education is now often called “career and technical education.” School teachers offer FFA for youth in public school settings (i.e. the formal education system). Organizers initially formed FFA with boys in farming communities taking agricultural education classes (National FFA Organization, 2020a). FFA's original purpose, the education of youth in agricultural fields of study, continues today. FFA is one piece of a three-component agricultural education model in the formal education system that includes classroom or laboratory instruction (contextual learning), Supervised Agricultural Experience programmes (work-based learning), and student leadership organizations (FFA) (National FFA Organization, 2020b). Classroom and laboratory instruction focuses on topics such as natural and social sciences, agribusiness, natural resources, animal and plant sciences, food science and safety, and entrepreneurship (National Association of Agricultural Educators, n.d.). Students also apply knowledge and skills from core subjects (e.g. maths, chemistry) to agricultural-related content. Through Supervised Agricultural Experience programmes, students apply what they learn outside the classroom through activities such as owning and operating their own business, working on a farm to gain industry-related skills or conducting research projects while being supervised by their agricultural education school teacher, parents or employer. FFA focuses on leadership development through public speaking, agriculture sales and marketing, proficiency contests and community service projects. Mississippi's first chapter began in 1934. National membership was opened to females in 1969.
At Mississippi State University, the Research and Curriculum Unit (RCU) began in 1965 to develop curricula and assessments, provide educator training, research and evaluate programmes, support and promote career and technical education and lead education innovations for the formal public schools (Kindergarten through to 12th grade) and higher education systems, including community colleges and LGUs (Mississippi State University Research and Curriculum Unit, 2020). Activities of the RCU support agriculture human capital development offered through the formal education system. For example, the RCU provides assessments for students in career and technical education programmes in the state in agriculture content as well as other areas such as culinary arts, digital media technology and architecture and drafting. Professional development for career and technical education teachers is offered through online classes and an annual conference. The RCU also coordinates a programme for new vocational education teachers or for individuals with other degrees who want to become vocational education teachers. Thus, both students and teachers can obtain training and certifications from the RCU.

Government entities and advocacy groups also contribute to agriculture human capital development in Mississippi. For example, the Mississippi Department of Agriculture and Commerce (MDAC) established in 1906 by the Mississippi legislature is a state agency that regulates and promotes agriculture-related businesses and products in Mississippi and around the world (Mississippi Department of Agriculture and Commerce, 2020a). MDAC is comprised of multiple departments: Mississippi Agriculture and Forestry Museum/National Agricultural Aviation Museum, Mississippi State Fairgrounds, Mississippi Farmers Market, Mississippi Board of Animal Health, Mississippi Agricultural and Livestock Theft Bureau, Bureau of Plant Industry, MDAC Market Development Division, and Bureau of Regulatory Services (Mississippi Department of Agriculture and Commerce, 2020b). In 2019, MDAC established an Agriculture Workforce Development Initiative focused on creating ways to connect students and job seekers to employers and job openings in the agriculture industry (Manning, 2020). As the primary state agency focused on agriculture, MDAC has relationships with other entities across the state. For example, MDAC and MSU Extension work together to hold an annual state fair to promote agriculture through competitive exhibitions (e.g. livestock, garden produce, food products, clothing) and displays of farm products (e.g. advanced technology, equipment, seeds).

In addition to the agencies mentioned above, Mississippi has numerous advocacy and commodity groups. For example, the Mississippi Farm Bureau (MFB) Federation is a voluntary, non-governmental, non-partisan organization that has worked to support family farmers socially and economically since 1922 (Mississippi Farm Bureau Federation, 2018a). MFB implements two leadership programmes: the Young Farmers and Ranchers Program, whose purpose is to develop young people aged 18–35 into future leaders and advocates (Mississippi Farm Bureau Federation, 2018b), and the Women's Leadership Program, which involves females in various community and leadership development programmes (Mississippi Farm Bureau Federation, 2018c). MFB also supports Agriculture in the Classroom, a programme for students in Kindergarten–12th grade (primary and secondary students) that provides knowledge about the food and fibre system and the critical role of agriculture in the economy and society (Mississippi Farm Bureau Federation, 2018d).
Other key state and federal partners inform agricultural formal and nonformal education and research in Mississippi, but they are not represented in this case. Examples include the Natural Resources Conservation Service; the Delta Council; the Rural Development Offices; the Mississippi Forestry Commission; the Mississippi Department of Wildlife, Fisheries and Parks; the Mississippi Consumer Education Partnership; and numerous state and regional boards representing different commodities such as corn, soybean, cotton, rice and peanut producers. Efforts by commodity groups include activities such as promoting their commodity, providing financial support for research, collaborating on policy development and holding field days where producers can learn about research and best practices for the specific commodity. Private industries such as farm equipment suppliers, seed companies and farm chemical producers also support human capital development in agriculture using methods that include training for current employees and internships for students. Although these groups and industries are extremely important to agriculture human capital development, their reach is more limited than those included in this case study.

The agencies described in this section work individually and collaboratively to build human capacities, ranging from technical skills (often referred to as “hard skills”) to managerial skills, and from empowerment to skills for the 21st century (sometimes called “soft skills”). These technical skills are intended to enhance: (i) animal production; (ii) aquaculture and crop production techniques; (iii) food and fibre systems; (iv) food production and safety practices; (v) natural resource conservation techniques; (vi) agribusiness marketing and economics; (vii) agribusiness management including estate planning, risk management and financial record-keeping; (viii) water and wastewater system management; (ix) agricultural mechanization; (x) environmental sustainability practices; (xi) horticulture; (xii) pesticide application; (xiii) child, youth and family well-being; (xiv) nutrition; and (xv) family resource management. Soft skills such as communication and leadership are also built during participation in formal and nonformal education and programmes through activities that include direct education (e.g. knowledge of leadership styles) and hands-on experience (e.g. community service) for youth and adults.
Given the expansive universe of initiatives and programmes incorporating aspects of human capital development in their approach to agricultural development, it is difficult to comprehensively assess these types of investments across similar models such as farmer field schools (FFS), even in a single country. However, using case studies can facilitate a deep understanding of the complexity of an initiative that seeks to develop human capital and elucidate the processes and phenomena in a given context (Baxter and Jack, 2008). This case study incorporates secondary data sources and primary qualitative data to elucidate the opportunities and challenges particular programmes face in developing human capital amongst family farmers in a given context.

SECONDARY DATA APPROACH
General demographic human capital indicators for the United States of America and Mississippi were extracted from a variety of secondary data sources to contextualize the project environment. Demographic indicators, information and communication technology (ICT) and educational attainment indicators were compiled from the World Bank Open Data website and the Human Capital Index. Additional data sources included the US Census Bureau, the US Department of Agriculture’s Economic Research Service, the National Agricultural Statistics Service, the State of Mississippi, the Congressional Research Service, the World Population Review and the Mississippi Department of Education. Information specific to the agencies represented in this case study was collected through their websites, annual reports and interviews (see below).

PRIMARY DATA APPROACH
Primary data were collected to document interagency collaboration in Mississippi related to the development of agriculture human capital. The MSU project team sought two perspectives:

- the agency perspective, and
- the perspective of current or former clients or participants of those agencies.
SAMPLING PROCEDURES
The MSU project team collected primary data following purposive and snowball sampling procedures to capture each respective agency perspective and those of clients of select agencies. First, the MSU project team used a purposive sample approach based on the following criteria to identify interviewees who:

- represent an agency in Mississippi dedicated to developing human agriculture capital, and
- could provide documentation of outcomes from agency efforts over the past 5 years.

The project team used a snowball sampling approach to identify clients and participants (hereafter referred to as “clients”) of agricultural agencies. In brief, an interviewer asked agency representatives to identify clients the team should recruit for interviews. No specific criteria were provided to agency representatives to guide selection of additional interviewees. Instead, the representatives were introduced to the scope of the project through the specific data collection procedures described below (i.e., email and informed consent statement), and these descriptions provided the context needed to identify clients who had extensive experience as recipients of agriculture human capital efforts.

DATA COLLECTION PROCEDURES
Before data collection, two team members (Downey and Peterson) developed standardized interview guides for agency representatives (13 questions with probes), individuals who had been clients as youths (10 questions with probes) and adult clients (10 questions with probes).

The team members introduced potential interviewees to the project through a standardized email developed by Peterson. While Downey and Peterson personally knew many interviewees as colleagues or students, Farrell did not personally know any of the interviewees prior to the study. To limit bias resulting from an existing relationship between researcher and interviewee, Farrell contacted and interviewed agency representatives with whom Downey and Peterson had close working relationships. Downey and Peterson reached and interviewed representatives with whom they had a limited working relationship.

Project team members invited 15 individuals to participate in the study, of whom 13 did so. Interviews were completed over Zoom (n=11) or telephone (n=2). Only one team member and the interviewee were present at the time of interview. Team members (Downey, Peterson, Farrell) followed the approved interview guide. All interviews were audio-recorded to allow for complete transcription. After a team member completed an interview, audio recordings were submitted to Same Day Transcriptions Inc. or Rev for transcription. The project team sent five interviewees their transcript and requested that they review their respective transcript for completeness and correctness. None of the interviewees requested changes to their transcript.
The project team used Braun and Clarke’s (2006) Phases of Thematic Analysis as a guide for analysis. Using that framework as a guide, team members used thematic analysis as their methodological approach. As Braun and Clarke (p. 79) state, “Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data.” According to these authors, “themes capture something important about the data in relation to research questions and represent some patterned response or meaning within the data set” (p. 82). Table 4 describes the analysis process and explains how the MSU project team followed the process during the study.

**Table 4**
Phases of thematic analysis

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description of the phase</th>
<th>Description of the phase as related to this study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Familiarizing yourself with your data</td>
<td>· Transcribing data (if necessary), reading, and re-reading the data, noting down initial ideas.</td>
<td>· Team members reviewed the transcripts independently and highlighted key text (by hand) but did not use qualitative data analysis software.</td>
</tr>
<tr>
<td>2. Generating initial codes</td>
<td>· Coding interesting features of the data in a systematic fashion across the entire dataset, collating data relevant to each code.</td>
<td>· Members identified initial codes based on the research aims of the case study and recurring ideas that arose in the data.</td>
</tr>
<tr>
<td>3. Searching for themes</td>
<td>· Collating codes into potential themes, gathering all data relevant to each potential theme.</td>
<td>· Collated codes into potential themes according to categories observed and gathered data relevant to each possible theme. Team members reached a consensus on major themes and did not explore minor themes.</td>
</tr>
<tr>
<td>4. Reviewing themes</td>
<td>· Checking if the themes work with the coded extracts (Level 1) and the entire dataset (Level 2), generating a thematic “map” of the analysis.</td>
<td>· Checked if the major themes worked with coded extracts and the entire dataset, generated a coding scheme.</td>
</tr>
<tr>
<td>5. Defining and naming themes</td>
<td>· Ongoing analysis to refine the specifics of each theme and the overall analysis, generating clear definitions and names for each theme.</td>
<td>· Refined the specifics of each theme through ongoing analysis and generated clear definitions and names for each theme.</td>
</tr>
<tr>
<td>6. Producing the report</td>
<td>· Final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating the analysis to the research questions and literature and producing a scholarly report of the analysis.</td>
<td>· Selected examples related to the case study’s aims and previous literature and produced this report.</td>
</tr>
</tbody>
</table>

Collaboration is essential to this case study and is critical to potentially transferring an interagency approach to other settings. Collaborations can “enable different people and organizations to support each other by leveraging, combining, and capitalizing on their complementing strengths and capabilities” (Lasker et al., 2001). Scholars and practitioners have documented the benefits of collaboration in the literature. In brief, benefits include “providing more innovative solutions to complex issues, reducing duplication of efforts, bringing together multiple human and financial resources, creating higher quality programmes” (Marek et al., 2015, p. 67). Similarly, LGUs and Cooperative Extension administration at those universities have favoured collaborative approaches that meet the needs of their clientele (Bruns and Franz, 2015).

Practitioners created the National Network for Collaboration framework to assist with understanding collaboration across agencies (Bergstrom et al., 1995). This framework is not unique to the agricultural capacity-building agencies in Mississippi. Rather, the project team used this framework as the lens through which findings are discussed. As part of the collaboration framework, a five-level description of possible collaborative relationships is provided, along with a description of their purpose, structure and process. The levels are identified and briefly described in Figure 2.

<table>
<thead>
<tr>
<th>Level</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networking</td>
<td>No shared leadership.  No shared resources.  Informal communication.</td>
</tr>
<tr>
<td>Cooperation</td>
<td>No shared leadership.  Limited sharing resources.  More communication to ensure tasks are done.</td>
</tr>
<tr>
<td>Coordination</td>
<td>No shared leadership.  Emphasizes sharing resources.  Frequent and clear communication.</td>
</tr>
<tr>
<td>Coalition</td>
<td>Shared leadership and clearly defined roles for group members.  Generates new resources (human, fiscal or technical).  Communication is frequent and is a priority for those involved.</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Leadership, trust level and productivity high.  Ideas and decisions equally shared.  Highly developed communication.</td>
</tr>
</tbody>
</table>

**Figure 2**
National Network for Collaboration Framework: key characteristics

SOURCE: Adapted from Bergstrom et al., 1995.
CHARACTERISTICS OF INTERVIEWEES
Most interviewees were representatives of agricultural agencies (n=8). Client interviewees were primarily past participants of youth development agencies (n=4) as compared to adult-serving agencies. Most interviewees were women (n=9). Table 5 presents the characteristics of interviewees.

Table 5
Characteristics of interviewees

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respondent perspective</strong></td>
<td></td>
</tr>
<tr>
<td>Agricultural agency representative</td>
<td>8 (62%)</td>
</tr>
<tr>
<td>Client or participant in agricultural agency's programme</td>
<td>5 (38%)</td>
</tr>
<tr>
<td><strong>Client or participant perspective</strong></td>
<td></td>
</tr>
<tr>
<td>Participated as adult</td>
<td>1 (20%)</td>
</tr>
<tr>
<td>Participated as youth (18 years of age or younger)</td>
<td>4 (80%)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>9 (70%)</td>
</tr>
<tr>
<td>Male</td>
<td>4 (30%)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>Older than 18 years of age</td>
<td>13 (100%)</td>
</tr>
</tbody>
</table>

SOURCE: Authors' own elaboration.
Chapter 4
Evidence base for success in human capital development

Agriculture in Mississippi is a very diverse industry, requiring multiple organizations and agencies to work individually and collaboratively to build agriculture human capital in the state. In this case study, success is conceptualized as a synergistic environment where highly effective individual agencies work together to produce a greater effect than one agency could create on its own. In other words, through a combination of individual agency perspectives, resources and skills, the group creates something valuable together – a whole that is greater than the sum of its individual parts (Lasker et al., 2001). Through this synergy, human capital development opportunities increase awareness of the important role of agriculture to the state, develop agricultural knowledge and skills among youth and farmers and strengthen connections among agencies and organizations.

INCREASING AWARENESS OF THE ROLE OF AGRICULTURE
Increasing awareness of the role of agriculture in Mississippi as well as the job opportunities that exist may help reduce perceptions of agricultural careers as hard work with low returns. As one agency-representative interviewee indicated,

We’ve got to show them [students] that there are careers here in Mississippi so that they can have a good, solid career, a good, solid salary, and not have to leave. So many kids choose healthcare because they can stay right where they are and are guaranteed a job, and lots of kids here will choose the military because they can go serve for four years and then come home and work in the Air Guard or in the Army Guard. [Female, formal public education representative]

A former client also described how her experiences influenced her career decisions and helped her obtain her current full-time job with MDAC’s Workforce Development initiative while remaining involved with her family’s cattle operation until she is able to have her own:
I tell everybody 100% that [nonformal education] is one of the reasons that I’m in the career field I’m in and the reason I majored in agriculture, because the importance of agriculture was instilled in me growing up, but it was really reinforced through [nonformal education], and all the cool opportunities that I had to do through [nonformal education], and the opportunities it gave me with other agencies … Mississippi Cattlemen’s Association and the Junior Cattlemen’s Association … meet professors from Mississippi State … in the Animal and Dairy Sciences Unit. [Female, nonformal education client]

Changing perceptions of agricultural careers may encourage youth and adults to explore ways to develop their agriculture human capital. As mentioned in the Background section, the average age of the Mississippi farmer is 59 years, with 34 percent being over 65. Agencies individually and through collaborative efforts could give special attention to building agricultural awareness among youth and young adults as they are the future of agriculture in the state.

OUTPUTS AND OUTCOMES
Figure 3 displays an aggregation of the major activities or outputs implemented to build human capital and the outcomes and impacts that result. Annex 1 contains a table that details the goals, outputs (major activities and number of people reached), outcomes (hard or technical skills, soft or functional skills, and empowerment) and impacts for each agency represented in this case study.

Figure 3
Theory of human capital development

SOURCE: Authors’ own elaboration.
Agencies represented in this case study use multiple modes to connect with their primary audiences. Face-to-face or synchronous online formal classes and nonformal educational workshops, educational curriculum and certification programmes (require passing an assessment to achieve certification), field days, tours and demonstrations as well as one-on-one technical assistance are direct approaches used across organizations to build agriculture human capital. These direct methods involve two-way interaction between educator and learner. Settings for direct methods of education and skill building range from campgrounds and fairgrounds to businesses, schools, prisons, and religious buildings, to MSU Extension offices, community centres, farms, and forests. Indirect education involves one-way sharing of information from an educator to an audience through methods such as websites, social media, mass media and publications. Train-the-trainer professional development involves preparing an educator to deliver information to a learner. This approach is used in the formal and nonformal education systems as a way to expand reach to additional audiences. State governmental organizations and state advocacy and commodity groups also use policy and legislation as a method to support investments in agriculture human capital. As an advocacy group representative [female] described, “[We are] primarily a policy organization. One of our main missions is to help enact good sound public policies at the local, state, and national level that enable farmers to be able to continue making a living farming.”

Offering agriculture human capital development through multiple delivery methods enables individuals to select the opportunities that best meet their situation, needs, and learning preferences.

Many agencies use a combination of modes, not just one, to reach their audiences. For example, FFA uses a three-circle model: “The leadership part, though, is usually what draws students in … The teaching is very important as we impart the knowledge, but the kids come to class because they have to … pulling in the experiential learning part, that's where it all comes together for the student” [female, formal public education representative]. Regardless of the specific delivery method used, one key component is the sharing of “research-based content, the science that we teach” [male, nonformal education representative]. A second critical element is ensuring educational content is up-to-date. As one agency-representative interviewee stated,

“We have to stay very in tune to the shifts and the change of innovation for ag[riculture] ’cause we no longer, not everybody drives a tractor anymore.”

[Female, formal public education representative]

As another respondent described it:

“One of the more innovative things that's going on right now is stuff we're doing with precision agriculture, and drones, apps, smart apps.”

[Male, nonformal education representative]
Content delivery has also been expanding as ICT becomes more advanced and widespread:

**Cutting edge technology, as well as delivery methods, Zoom, like we’re using today with COVID you kind of sent that to the top of everybody’s list. But prior to that, we had people working on electronic and social media and other ways of delivering information rather than a typical pamphlet, or newsletter, or a face-to-face meeting.** [Male, nonformal education representative]

As another organizational-representative interviewee noted,

> “Especially during this pandemic, we’ve been interchanging how we’re doing meetings online or virtually.”
> [Female, nonformal education representative]

Use of distance learning technologies allows agencies to reach a broader audience and continue to promote greater awareness of the role of agriculture in the state as well as build agriculture human capital.

Agency reach is state-wide, with each organization working with audiences throughout the entire State of Mississippi rather than in only one specific community. For example, MSU Extension has an office in all 82 counties in the state staffed by at least one Extension Agent who is county-based and connected to the community:

> “It’s a function of a land-grant university. It’s public. It’s open to everyone. And there’s not just anything else like that in the country that provides that to rich, poor, young, or old, any race, colour.”
> [Male, nonformal education system representative]

This enables MSU Extension to serve all residents of the state. As another example, one focus of the MDAC is to foster partnerships with the agriculture industry and educational institutions. [Female, state government agency representative]

Despite regional differences in type of agricultural industry and educational institutions, as a state agency, MDAC serves as a bridge that connects youth and adults interested in agriculture with appropriate resources to enhance their capacity. Therefore, state-wide reach promotes inclusivity and broad access to human capital development opportunities.

Youth and adults can participate in multiple agencies simultaneously to enhance their knowledge and skills related to agriculture and other life skills in Mississippi. For example, a high school student in the formal education system can participate in FFA through school as well as in the nonformal education provided by 4-H or Extension; or a female farmer can attend an educational programme offered by MSU Extension related to farm pond management, while also participating in the Farm Bureau's Women as Leaders Program. Simultaneous participation results in complementary learning and reinforces skills.
Clients of agencies in this study provided examples of content knowledge and technical skills in a specific agricultural topic. Additionally, a focus of many organizations was on developing soft skills and a sense of empowerment:

“I learned basic livestock background… stuff about cattle, about livestock in general, not just about cattle, but how the whole industry works. How it feeds and supplies our world… I was in this programme called The Heifer Development Program that 4-H and FFA does and it’s kind of like a nine months process type deal… I learned a lot about the value of money through that programme… how to work hard… leadership abilities and work ethic… It just builds you into a better contributing citizen.”

[Male, nonformal education former client]

“The skills, doesn’t matter the content area, are transferrable … Those are skills you need as an adult, not necessarily in a specific field … you need those skills no matter where you go … you need to draw on research and communicate clearly, and ask questions.”

[Female, formal public education representative]

Interviewees provided examples of what was gained through their participation in various programmes:

- I think a majority of the leadership skills happened when I started to get older and I started to help out with the younger 4-H, like with different programmes and stuff … I would help the kids who just started showing goats and teach them things. [Male, nonformal education former client]
- I definitely learned a lot of my soft skills … how to speak in front of people, professionalism, how to network, just all-around people skills … FFA helped me with … learning about different people and how to, especially now that I’m in the classroom, how to talk to different people with different backgrounds than me and try to relate to them and not leave anybody out. [Female, formal public education former client]
- You learn about insurance and common issues of estate planning … Tax, basically all of the business components of a farm is what we learned about. [Female, nonformal education current client]
The combination of multiple delivery methods and state-wide reach results in positive outcomes related to hard or technical skills, soft or functional skills and empowerment. The varied outcomes that result from activities in this systems-based approach ultimately lead to impacts across the state. In reviewing agency documents, evidence of impacts was observed. These impacts included increased agricultural productivity, reduced expenses, higher individual or farm incomes, networks that link farmers and other producers across the state, a better prepared workforce and a strong agriculture industry with good economic returns. Two specific examples demonstrate these impacts:

- MDAC partners with the Mississippi Department of Education (MDE) to administer the Department of Defense Farm-to-School Program (Mississippi Department of Agriculture and Commerce, 2019). MDAC serves as a liaison between MDE and Mississippi farmers who grow fruits and vegetables. In the 2018–2019 school year, schools in the state ordered USD 421,282 of produce from Mississippi farmers. To expand the timber industry in Mississippi, MDAC’s Timber Commerce Division built working relationships with other agencies, manufacturers and private organizations during 2019 to help establish additional domestic and international markets. In 2019, MDAC’s Bureau of Plant Industry issued nearly 4,000 pesticide applicator certificates and collected over 34,000 pounds of waste pesticide products for disposal, thus reducing environmental impacts of unsafe pesticide use.

- In 2018, MSU Extension activities resulted in condition changes for approximately 54,338 participants across the state (Peterson et al., 2019). Condition changes can occur only after knowledge, skills, behaviours and practices change. Documented specific condition changes include: (i) enhanced agricultural productivity or profitability for farmers and other producers; (ii) improved environmental stewardship by landowners; (iii) improved individual and family health and child and family well-being; (iv) improved communities and businesses through community resource development strategies; (v) reduced high-risk behaviours; (vi) increased healthy behaviours; (vii) increased involvement in science, engineering and technology; and (viii) enhanced leadership and citizenship skills among youth.

The individual agencies acting to advance human capital in agriculture allow for these results through a collaborative network of action. The mechanisms, values and perceived benefits of collaboration by agencies are essential to understanding the use of a synergistic, networked approach.

COLLABORATIONS ACROSS THE SYSTEM
Each agency-representative interviewee spoke of how the Mississippi system contributes to agriculture human capital in the state. Each of these interviewees had a clear understanding how collaboration with other agencies strengthens the whole and specific outcomes. One interviewee stated:
“So, I think in Mississippi, we’re very fortunate to have a great network of organizations that work together to build that sort of collaborative ag community and engage those different groups. ... We all sort of realize that we are in this thing together and we are much more successful by working with each other than against each other.”

[Female, advocacy group representative]

As presented above, outputs, outcomes and impacts are far-ranging, and each interviewee identified what an agency contributed to the state’s agriculture human capital. Each also articulated how interagency collaboration resulted in greater success than was possible through a single agency. These interviewees perceived that interagency collaboration was beneficial and contributed to the development of agriculture in three general ways:

- broadening the base of expertise available to clients;
- leveraging complementary resources to meet diverse audiences; and
- creating new initiatives.

BROADENING THE BASE OF EXPERTISE AVAILABLE TO CLIENTS

Each agency-representative interviewee worked for an entity with a defined mission, goals and strategic initiatives. Interviewees clearly distinguished between the nature of programmes or educational efforts and services which that agency provided and those of other agencies. Yet all interviewees recognized that their individual agency did not fully possess the expertise or capacity needed to meet Mississippi’s agriculture human capital needs. Rather, interviewees perceived interagency diversity in focus and approach to meeting client needs as a strength. In other words, what one agency could not provide, another agency could in the form of programmes or other types of efforts to develop agriculture human capital. When speaking of partnering agencies, one [male, nonformal education representative] interviewee stated that “different people have different expertise.” This interviewee emphasized that the different knowledge and expertise among partners results in a “broader and deeper base of knowledge.” Another [female, formal public education representative] interviewee stated: “[We are] not the end-all, be-all, know-everything. So, we have to depend on the knowledge and sustainability and the capacity of other resources...”

In general, interviewees seemed to value differences among agencies and recognized that diversity in capacity and services resulted in diverse opportunities for agriculture human capital development in the state. Clients notice the diverse opportunities provided by different agencies. For example, one respondent [female, nonformal education former client] had participated in 4-H and FFA. She spoke of how participation in both organizations helped her develop leadership skills. Yet, with FFA, she received “agriculture class, so like ag[riculture] science, animal science.” In comparison, her participation in 4-H let her explore broader topics such as shooting sports. Through both programmes, she developed leadership and public speaking skills.
LEVERAGING COMPLEMENTARY RESOURCES TO MEET DIVERSE AUDIENCES

Interviewees also recognized that their respective agency had differing types and amounts of resources than collaborators. Interviewees identified the following types of resources among agencies: space, connections to individuals or groups, endorsements, convening power and the ability to bring people together. These diverse resources were mentioned to a varying degree by interviewees. Yet, all interviewees identified resources possessed by their agency and others that in totality result in meeting the needs of audiences. Although no agency possessed all types of resources, each type of resource is available across the agencies for the development of agriculture human capital. As one interviewee stated:

“Partners are really good at leveraging their resources and being open to share those resources. It’s really fun when you sit around the table with our partners from different aspects of agriculture and say, ‘Let’s have an ag expo,’ and they’re all like, ‘I’ve always wanted to do that.’ … Whenever you open the door to collaboration, it’s really a lot of fun to see what resources are there and what people would like to do.”

[Female, state government agency representative]

“Working collaboratively across groups, we have a better chance of reaching a large number of individuals engaged in agriculture big and small, organic, conventional – different groups than one organisation might be able to reach on its own … I think the benefits, one of them, one of the most important, is that we can reach different groups. We all have some different audiences. And while a lot of our members overlap different organisations, there’ll be some that are more involved in certain organisations than others.”

[Female, advocacy group representative]

Interviewees perceived differing interagency resources as complementary and, in some instances, resulting in shared activities.

Complementary resources among interagency collaborators allow partners to meet the needs of diverse audiences in the state. Interviewees identified audiences, including youth from kindergarten to high school (i.e. primary and secondary students), young farmers, specialty crop producers, women in agriculture, small-scale farmers and large row-crop producers. Interviewees provided specific examples of how individual agencies contribute to meeting needs in the way that they are best equipped and resourced to do so. One example is that as Extension has broad access to
wide-ranging communities or certain groups, they are often approached to promote an educational event sponsored by another agency. Another example is that of a partnering agency providing financial scholarships for 4-H’ers to attend a national 4-H Congress in Washington, DC. In some cases, if complementary resources were not pooled, opportunities for human capital development would be missed.

CREATING NEW INITIATIVES
Agency-representative interviewees spoke of new initiatives that had resulted from combining the perspectives, resources and skills of partners. In these examples, interviewees talked about interagency collaboration beyond the existence and sharing of complementary resources for short-term activities. Rather, interviewees described efforts that combined expertise and resources to meet the complex needs of agricultural clients in the state. One interviewee [male, nonformal education representative] described an interagency collaboration that resulted in a comprehensive programme to support the development of Mississippi’s local food industry. Another interviewee spoke of a programme for emerging leaders in the agricultural industry in the state, stating that:

“The [Agricultural Leadership Program] is another very good example of [how] different organizations and groups and ag[riculture] industry partners around the state have worked together to pull resources and thoughts and ideas to have a programme that helps develop strong agricultural leaders in our state that span all different industries and commodities and geographic locations, too.”
[Female, advocacy group representative]

The agriculture leadership programme referenced in this quote is a two-year seminar series that develops the next generation of leaders in agriculture and rural communities. This programme is implemented through MSU Extension and sponsored by the Mississippi Farm Bureau Federation.
In Mississippi, the formal education system, nonformal education system, state government agencies and advocacy groups are all significant contributors to agriculture human capital development. By working individually as well as together, these entities reach youth and adults across the state through education, legislation and advocacy to enhance the agriculture industry. Agency representatives and current and former clients described the hard or technical skills (e.g. livestock knowledge, horticulture skills, cutting-edge technology skills, financial management) and soft or functional skills (e.g. leadership, professionalism, communication skills) gained. Evidence of these outcomes has been consistent across data sources and over time. Such knowledge and skills lead to empowerment that ultimately results in numerous benefits, including increased agricultural productivity, reduced expenses, higher individual or farm income, networks linking farmers and other producers across the state, a better prepared workforce and a strong agriculture industry with good economic returns.

However, nearly all interviewees noted that reaching youth is essential for building agriculture human capital. As one agency representative [female, state government agency representative] stated, “Youth development for sure, we need more advocacy for ag[riculture] careers, starting in the elementary level,” while another [female, formal education system] said, “exposure to the content at an early age … so those students that take those ag courses always have a connection to agriculture beginning at an early age that can point them in … some of their ag directions.” With elementary school children, it may not be possible to develop agriculture knowledge and skills, but enthusiasm for the subject matter can be cultivated. As children age, their enthusiasm for a particular agriculture subject may result in their participation in youth development opportunities such as those offered by 4-H or FFA or even formal training in college. Interviewees valued a long-term approach to human capital development, which they perceived as advantageous. As one interviewee noted:
The MSU project team did not use the National Network for Collaboration Framework (Bergstrom et al., 1995) as part of their thematic analysis. Rather, the team used this model as a conceptual framework or a lens through which to interpret the findings. The framework was helpful in general because it suggests that interagency relations can vary based on several factors, such as frequency of communication, the purpose of the relationship, and commitment to sharing resources or working together. Not all interagency collaborations are the same, nor do they have to be to do good work. Rather, as observed in this case study, varying levels of involvement and respect for differences are important to productive interagency collaboration. As suggested in the framework, the nature of collaboration – communication, level of involvement, and amount and type of resources shared – differs across partners and situations.

Interagency collaboration successes in this case study – namely broadening the base of expertise available to clients, leveraging complementary resources to meet diverse audiences and creating new initiatives – loosely align with the varying degree of working relationships suggested in the National Network for Collaboration Framework. For example, collaboration that broadens the base of expertise available for clients could be networking or cooperation, as presented in the framework. In these interagency relationships, partners are aware of what others contribute to agriculture human capital development and may even work together on a shared event or activity (e.g. agriculture expo). Yet, keeping with this example, the combined effort is small-scale and short-term. In contrast, an interagency collaboration that creates new initiatives more clearly aligns with the concept of collaboration in the framework because there is a common vision, sustained commitment, and formalized roles, times and evaluation. The collaborative approaches in Mississippi also extend across multiple scales and types of commodities. Large producers will rely on some of the same actors as small family farms for technical information or market access. Indeed, many of the respondents highlighted the ability to work with both corporate entities as well as small-scale farms that are not a producer’s primary source of income so that the model can be said to work across commodities, producer types and value chains.

Although a more intense relationship is often perceived as ideal, it may not always be necessary for accomplishing the task that needs completing. Therefore, discussion surrounding the range and functions of different working relationships could help practitioners determine the level of relationship that would be most beneficial in other contexts. For example, a working relationship with a community agency or organization may be most effective at the level of cooperation when the primary purpose is to recruit participants for training works or extension programmes. On the other hand, a working relationship with a practitioner in another region may be most effective at the level of collaboration if those practitioners are partnering to implement a long-term educational programme across multiple areas.

“I really think that we need to step back and make a concentrated effort to start with very young children. And it may take 12 to 15 years to really reap the benefit of it.”

[Female, nonformal education current client].
RECOMMENDATIONS
A synergistic approach through interagency collaboration like the one found in Mississippi can be applied in other settings. For this to be possible, certain barriers must be addressed and an enabling environment must be created. Recommendations for doing this are provided below.

First, individual agencies must be successful on their own at building agriculture human capital. For example, they must address the needs of a defined target audience through high-quality learning experiences that achieve their intended outcomes. To achieve success at building human capital, they must understand the current needs of their population and seek the best mechanisms or interventions to address those needs. This may include building an agency's own network to seek guidance and sources of information to develop human capital within the organization. Once an organization has defined its expertise and is clear about its mission, it can successfully work on behalf of the target population. Individual success breeds group success.

Second, individual agencies must have resources that are complementary to other agencies' resources. These resources include money, space, equipment, goods, skills and expertise, connections, endorsements and convening power (Lasker et al., 2001). For example, one agency might have a technology infrastructure to reach audiences across the state that another is missing. However, the agency without technology infrastructure has content expertise for providing relevant training. Thus, it is imperative that agencies know their strengths and weaknesses and seek to understand other agencies' strengths through indexing available actors and organizations. This knowledge of the network and actors bridges the gaps and lowers the barriers to initial partnership. It also informs current practices and interventions and will preserve resources through knowledge of past successes and failures. Through collaboration, these agencies are able to meet the need of building agriculture human capital. From a collaborative point of view, the combination of available agricultural resources allows for a trustworthy source of information to be available when and where needed.

Third, because the nature of working relationships between two or more agencies can differ (Bergstrom et al., 1995), it is important that all partners be clear about how they will function in order to prevent confusion and failure. They must jointly determine the nature of the relationship in terms of the purpose and vision, function, roles, resource sharing, levels of communication, trust and shared decision making. It is important to share this information and clarity with those being served as this will provide them with an understanding of the specific sources for future information so that individuals may broaden their own social capital network (Keeley, 2007). In addition, other factors influence successful collaboration and must be considered: political climate, history of cooperation, flexibility and adaptability among partners and likelihood of achieving desired outcomes. Interviewees noted that as their networks engage in cooperation and coordination, the activities become value-added in that they begin to coalesce around objectives. This leads to collaborations that can tap into demographics that were previously underserved, commodities that may have been underexplored and resources that, when combined, can produce higher total value to the state. Promoting collaborative models such as the National Network for Collaboration Framework can inform leaders and practitioners in different disciplines and agencies about important characteristics to consider for effective working relationships.
Fourth, technology can provide a path for collaboration, discussion, market connections and technical support. While respondents found that face-to-face communication will always have a place, the capacity of technology may allow for a wider or more diverse audience. The use of technology does not have to exist only as a one-way information sharing relationship. As reliable wireless communication networks are being rapidly deployed globally, the ability to utilize social media or app-based platforms for agriculture human capital enhancement is a growing trend. Agro-technology companies are also finding ways of building networks and engaging in human capital enhancement. Partnerships between technology entities, educational systems or other agencies engaging youth through technology may provide paths to increased knowledge and excitement about food production systems, help create rural jobs, and potentially alleviate some of the stresses present in modern urbanization trends.

Elements of individual agency approaches to building agriculture human capital as well as strengthening connections and collaborations among agencies are techniques that can be adopted by other organizations, communities and countries around the world. Targeting youth audiences can create interest in agriculture that is sustained over time. Building agriculture human capital is critical to enhancing farmer livelihood, increasing rural prosperity, improving food security and promoting the sustainability of agriculture.
References


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REFERENCE


REFERENCES


## Annex

**Table 6**  
Goals, outputs, and outcomes for agencies represented in this case study

<table>
<thead>
<tr>
<th>Goals</th>
<th>Major activities</th>
<th>Number reached in Mississippi</th>
<th>Outcomes: Hard or technical knowledge and skills</th>
<th>Outcomes: Soft or functional knowledge and skills / empowerment</th>
</tr>
</thead>
</table>
| **Mississippi State University Research and Curriculum Unit** | Educate and prepare Mississippi students to help them become college-, career-, and life-ready by offering a career and technical education (CTE) curriculum for the Mississippi’s Department of Education | Develop curricula for agriculture programmes in formal education settings:  
- agriculture and environmental science and technology (e.g. agriscience, animals, plants, mechanization, environment and agribusiness)  
- agricultural and natural resources  
- agriculture power and machinery  
- aquaculture  
- food products  
- forestry  
- horticulture  
- Develop assessments for certification requirements  
- Provide cyber education  
- Deliver professional development for high-school teachers and an alternative teaching certification programme for those with content skills but no formal educator training | Approximately 6000 students in 8th–12th grade  
- 132 agricultural education teachers  
- 81 school districts  
- RCU indirectly reaches students | 2492 high-school CTE students earned national certifications in agriculture and other programme areas (2019)  
Network of educators across the state  
RCU's work is influenced by the National FFA Organization given the ties both have to the formal education system, so focus is on technical knowledge and skills |

| **Mississippi State University Extension 4-H Youth Development** | Create supportive environments for culturally diverse young people and adults to reach their fullest potential through experiential learning |  
- Provide formal and nonformal community-focused experiential learning  
- Develop skills that benefit young people throughout life  
- Foster leadership and volunteerism in 4-H'ers and adults  
- Construct internal and external partnerships for programming and funding  
- Strengthen families and communities  
- Use research-based knowledge and land-grant system to provide quality programming for young people and adults |  
- 69 254 youth (2019)  
- 1635 youth exhibited 2263 head of livestock in Dixie National Jr. Roundup Show  
- 4424 registered adult volunteer leaders |  
- Knowledge and skills for raising livestock, and the responsibility needed to do so  
- Understanding of the agriculture industry  
- Value of money  
- Cooking skills  
- Livestock judging  
- Knowledge and skills to grow crops  
- All-terrain vehicle (ATV) safety skills  
- Archery and firearm safety skills  
- Healthy living knowledge and skills  
- Science, technology, engineering, mathematics and robotics knowledge and skills  
- Family and consumer sciences skills  
- Leadership skills  
- Decision-making skills  
- Goal-setting skills  
- Public speaking skills  
- Work ethic  
- Teamwork  
- Patience  
- Confidence  
- Professionalism  
- Relationships with youth that are sustained over time  
- Relationships with mentors and role models  
- How to be a better contributing citizen  
- Community service and volunteer projects |
### Mississippi Department of Agriculture and Commerce – Workforce Development Initiative

**Meet the demands of the agriculture workforce in Mississippi**
- Creating awareness of the need for a skilled agriculture workforce
- Connecting industry partners to employees
- Providing internships and job shadowing opportunities

**Programme began in 2019**
- Pipeline of education and training opportunities for students in high school and college who are pursuing a career in agriculture
- Partnerships among agriculture industry and educational institutions to boost interest in agriculture careers and increase the number of qualified applicants for jobs.

### Mississippi Women for Agriculture

**Increase the knowledge and skills of women in all aspects of farm and agribusiness management, including risk management**
- Provide education based on Annie’s Project on the following topics: business plans, estate planning, financial record-keeping, financial statements, human resources, marketing, risk management, technology security and women and money
- Provide USD 500 college scholarships to young women interested in careers in the agriculture industry

**Approximately 60 members each year**
- Estate planning knowledge and skills
- Farm financial and other management skills
- Risk management knowledge and skills
- Support network (relationships) of other women farmers
- Motivation
- Teamwork
- Young women pursue agriculture-related education

### Mississippi Farm Bureau Federation

**Provide a unified voice for Mississippi agriculture in the legislative arena, promote farm markets and serve as a leader in the state’s agricultural community on local, state, national and international levels**
- Advocate for legislation and policy related to agriculture
- Implement and support programmes:
  - Agriculture in the Classroom (education for K-12 students on the food and fibre system and the role of agriculture in the economy and society)
  - Safety education
  - Young Farmers and Ranchers (educate adults aged 18–25 on how to provide leadership in building a more effective Farm Bureau to expand agriculture opportunities)
  - Women in Leadership (opportunities for women to participate in community and leadership development programmes)

**177 000 families**
- State- and national-level agriculture policies with public support from Farm Bureau members
- Farm policy process knowledge
- Basic agriculture knowledge
- Safety skills (e.g. farm safety, ATV safety, texting and driving, fire safety, water safety, drunk driving)
- Leadership skills
- Advocacy skills

### Mississippi FFA

**Develop the potential of youth for premier leadership, personal growth and career success through agricultural education**
- Deliver agriculture education and CTE classes through the formal education system to prepare students for careers
- Oversee Supervised Agricultural Experiences that provide experiential learning outside of scheduled classroom time to help students learn more about agriculture and careers
- Build leadership skills

**3743 FFA Senior members in 108 local FFA chapters (2020)**
- Horticultural knowledge
- Agricultural science knowledge
- Animal science knowledge
- Forestry knowledge
- Food science knowledge
- Understanding of different career pathways
- Ability to communicate about agriculture to those outside the industry (e.g. advocacy)
- Leadership skills
- Networking skills
- Professionalism
- Public speaking
- Confidence
- Time management
- All-around people skills
Mississippi State University Extension

- Provide research-based information, educational programmes and technology transfer focused on issues and needs of the people of Mississippi, enabling them to make informed decisions about their economic, social and cultural well-being

- Identify needs of citizens
- Develop nonformal education programmes to meet those needs
- Provide nonformal education through multiple delivery methods
- One-on-one consultations
- Workshops
- Fact sheets
- Peer-reviewed publications
- Web-based information
- Social media
- Demonstrations
- Mass media
- Evaluate and report on education provided

- 3,886,072 contacts (direct and indirect education in 2018)
- 164,452 educational activities

- Knowledge and skills related to recommended agricultural practices of behaviours
- Implementation of Extension-recommended agricultural practices and behaviours
- Enhanced agricultural productivity or profitability
- Improved environmental stewardship

SOURCES: Authors' own elaboration.
Investing in farmers – or agriculture human capital – is crucial to addressing challenges in our agri-food systems. A global study carried out by the FAO Investment Centre and the International Food Policy Research Institute, with support from the CGIAR Research Programme on Policies, Institutions and Markets and the FAO Research and Extension Unit, looks at agriculture human capital investments, from trends to promising initiatives. One of the nine featured case studies comes from the State of Mississippi in the United States of America. Agencies from i) formal education systems; (ii) nonformal education systems; (iii) state governmental agencies; and (iv) advocacy and commodity groups collaborated to develop agriculture human capital among youth and adults. Agency documents, representatives and clients described technical skills and functional skills developed, resulting in benefits like increased agricultural productivity, reduced expenses, higher individual or farm income, networks linking farmers and other producers, a better prepared workforce and a strong agriculture industry with good economic returns. This publication is part of the Country Investment Highlights series under the FAO Investment Centre's Knowledge for Investment (K4I) programme.