TECHNICAL REPORT

Cost-effectiveness Analysis Comparing Integrated and Malaria-only Social and Behavior Change Programming in Nigeria: Initial costing data

SEPTEMBER 2021

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Breakthrough RESEARCH catalyzes social and behavior change (SBC) by conducting state-of-the-art research and evaluation and promoting evidence-based solutions to improve health and development programs around the world. Breakthrough RESEARCH is a consortium led by the Population Council in partnership with Avenir Health, ideas42, Institute for Reproductive Health at Georgetown University, Population Reference Bureau, and Tulane University.

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Avenir Health was founded in 2006 as a global health organization that works to enhance social and economic development by providing tools and technical assistance in policy, planning, resource allocation and evaluation. Its focus is on developing and implementing demographic, epidemiological and costing models for long-range planning to assist with setting goals, strategies, and objectives. Avenir Health assists in both developing and implementing programs in HIV/AIDS, reproductive health, maternal health and other programming areas. Avenir Health works with government agencies, foundations, corporations, and nongovernmental organizations around the world.

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Avenir Health

Acronyms

ANC	Antenatal care
ACG	Advocacy core group
DALY	Disability-adjusted life years
DHS	Demographic Health Survey
FCT	Federal Capital Territory
FP	Family planning
HC3	Health Communication Collaborative
HCD	Human-centered design
LGA	Local government area
LLIN	Long-lasting insecticidal net
LOE	Level of effort
MNCH+N	Maternal, neonatal, and child health + nutrition
SBC	Social and behavior change
TFR	Total fertility rate
USAID	United States Agency for International Development
WDC	Ward Development Committee

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EXECUTIVE SUMMARY

Breakthrough RESEARCH is conducting an effectiveness evaluation of social and behavior change (SBC) programming implemented by Breakthrough ACTION in Nigeria, comparing an integrated SBC program in Kebbi and Sokoto state with a malaria-only SBC program in Zamfara state. Utilizing these results on impact, a cost-effectiveness analysis will determine which approach is more cost-effective in achieving improvements in health. The primary objective of this report is to estimate the costs for the initial stage of the project from April 2018 through December 2019 in the three northern states where the study is being conducted.

Methods

The overall framework for the costing approach is detailed in Breakthrough RESEARCH's Guidelines for Costing of Social and Behavior Change Health Interventions. Three data sources are used in the analysis:

- Breakthrough ACTION **non-personnel expenditure** data extracted from the project financial system, which allowed for classification of expenditures by nine program activities;
- Breakthrough ACTION **personnel data** estimated using a data collection form, differentiating between personnel time spent on design vs. implementation and program activities vs. program support in each study state; and
- **Sub-partner expenditure data**, both personnel and non-personnel, from five consortium sub-partners (CCSI, Save the Children International, Think Place, Ideas42, and Viamo) obtained through interviews and a data collection form.

Leveraging these three datasets, the total costs for the initial period of the Breakthrough ACTION-Nigeria project (April 2018 – December 2019) were calculated in Microsoft Excel using the following steps:

1. Summarized Breakthrough ACTION-Nigeria personnel costs by design vs. implementation phase and program activities vs. program support.
2. Summarized the breakdown of non-personnel expenditures for Breakthrough ACTION for each state into six activity categories (advocacy, capacity strengthening, community SBC, mass media + mobile digital, long-lasting insecticidal net campaign, and provider behavior initiative) and three support categories (operations, monitoring and research, strategic coordination).
3. Summarized partners' costs from five partner organizations.
   a. Used personnel data percentages to allocate non-personnel expenditures.
   b. Used non-personnel expenditure percentages to allocate personnel costs.

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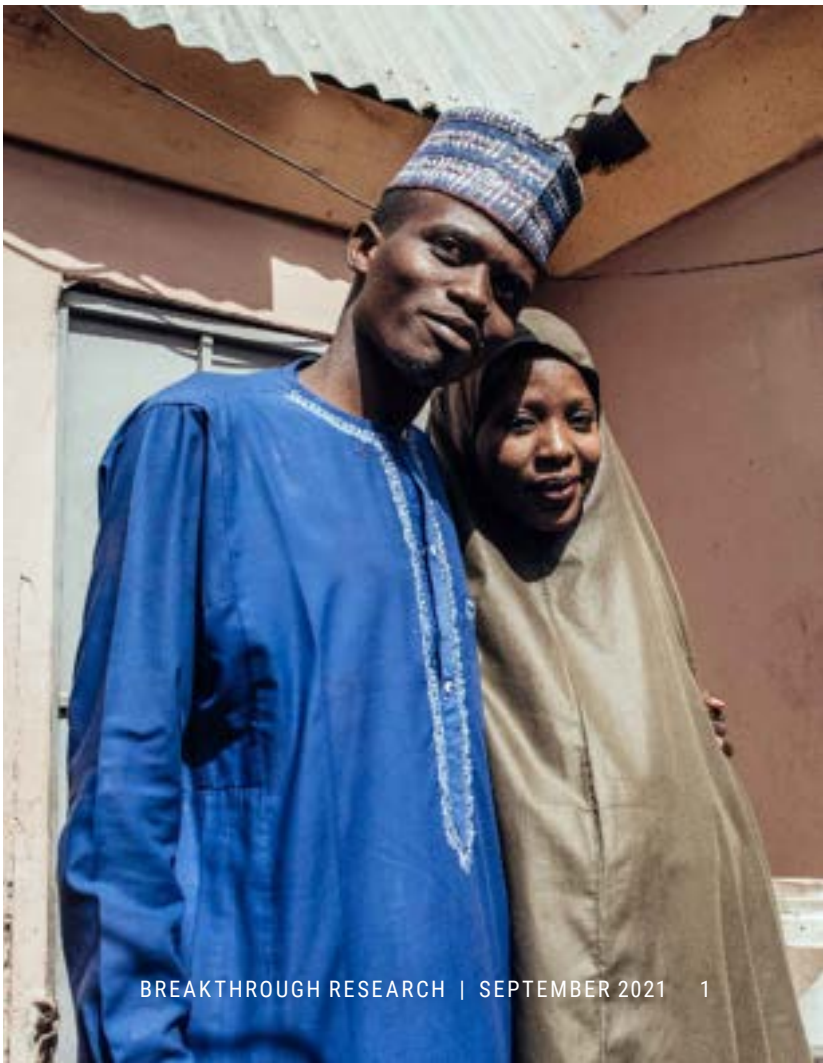

Results

In total, Breakthrough ACTION-Nigeria spent approximately $5.5 million in the three study states of Kebbi, Sokoto, and Zamfara from April 2018 through December 2019, including costs incurred at the Abuja and Baltimore offices which were then proportionally allocated across each of the study states. Among the study states during this period, design costs were, on average, 29% of the total cost and implementation costs were 71%. When costs are disaggregated by program activity vs. program support costs, program activity expenditures are higher than expenditures on program support for both SBC models. In Zamfara, program activity costs accounted for a substantially larger share (73%) of costs when compared to Kebbi and Sokoto, where program activity costs accounted for 62% and 64%, respectively. Among the SBC activities, the highest proportion of costs were associated with community SBC interventions, accounting for 46% in the malaria-only state and 38% in the integrated states.

Total costs by state during this period show lower overall costs for the malaria-only program in Zamfara at approximately $794,000 compared to over $2 million in both Kebbi and Sokoto. This difference in large part reflects the different scale, with the expected reach of community SBC lower in Zamfara (10% of those aged 15–49) than Kebbi and Sokoto (25% of those aged 15–49). Estimated unit costs for community messaging (e.g., radio and digital messaging), based on expected program reach, ranged from $0.41 to $0.62 per targeted person reached, with the lowest costs in Zamfara. For community SBC (e.g., health dialogues, home visits), estimated unit costs during this phase ranged from $3.20 to $4.03 per targeted person reached, with Zamfara in the middle at $3.53 per targeted person reached.

Conclusions and next steps

These findings provide insights on the initial phase of the Breakthrough ACTION-Nigeria program and will be combined with additional cost data from 2020 through 2022 to assess the total costs and cost-effectiveness of the integrated vs. malaria-only approach in achieving health outcomes. These initial findings indicate the importance of including the initial design costs in examining the total cost of SBC programming.

INTRODUCTION

Breakthrough ACTION and Breakthrough RESEARCH are the flagship programs of the United States Agency for International Development (USAID) for social and behavior change (SBC), working to increase the practices of priority health behaviors for improved health and development outcomes. Breakthrough RESEARCH is conducting an effectiveness evaluation of two different approaches to SBC programming implemented by Breakthrough ACTION in Nigeria.[1] Utilizing these results on impact, a cost-effectiveness analysis will leverage findings from the Breakthrough RESEARCH effectiveness evaluation to determine which approach (integrated vs malaria-only) is more cost-effective in achieving improvements in health, as measured by disability-adjusted life years (DALYs) averted, both overall and specifically for malaria SBC programming.

This study presents the costing estimates for the initial stage of the project from April 2018 through December 2019 in three northern states in Nigeria where the impact evaluation is being conducted (Kebbi, Sokoto, and Zamfara). The report outlines a brief background on Breakthrough ACTION's programming in Nigeria, describes the study objectives, methods for costing, and presents the results of the analysis. Using Breakthrough RESEARCH's SBC Costing Guidelines[2] to guide the costing analysis, the results from this report will be combined with costing data to be gathered over the other stages of the program to form the costing basis of the final cost-effectiveness analysis.

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BACKGROUND

As part of a multi-sectoral development agenda, USAID/Nigeria works to strengthen health systems and improve the overall health status of Nigerians. Working with the Nigerian Government, USAID/Nigeria aims to improve human resources for health, deliver high-impact services, and strengthen leadership, management, governance, and accountability to improve a wide set of health outcomes related to maternal, neonatal, and child health + nutrition (MNCH+N), malaria, and postpartum family planning (FP) in Nigeria.[3] USAID supports health programs in eleven States and the Federal Capital Territory (FCT). While Breakthrough ACTION works in all 11 states and FCT, the evaluation study focuses on three states in northwestern Nigeria: Kebbi, Sokoto, and Zamfara. Table 1 below provides data on program coverage within the three Breakthrough ACTION study states and summary health indicators by state, according to the most recent Demographic and Health Survey.[4]

In the study states, these health indicators show a high burden of maternal and child morbidity. These realities indicate that ample opportunity exists to use SBC interventions to improve the health behaviors that partially underlie these poor health indicators.

USAID has long supported SBC activities in Nigeria, most recently through the Health Communication Capacity Collaborative (HC3) project, the predecessor to Breakthrough ACTION. From 2014 to 2018, HC3 used a menu of SBC approaches to promote birth spacing and voluntary use of modern contraceptive methods as well as to encourage practice of appropriate malaria prevention and treatment behaviors. From 2018 to 2022, Breakthrough ACTION is leveraging and expanding on these previous activities. Specifically, Breakthrough ACTION introduced integrated reproductive, maternal, neonatal, and child health + nutrition and malaria messaging[a] to Bauchi, Kebbi, and Sokoto using a life-stage approach, which focuses on health needs during four life stages: before birth, the first weeks of life, young children, and from five years to adulthood with a focus on women's and men's roles in family health.[1] Breakthrough ACTION has conducted extensive formative research to develop integrated messaging materials, focusing on gateway and/or multiplier effect behaviors, such as antenatal care (ANC) and routine immunization. Breakthrough ACTION is also supporting SBC messaging to promote the use of various malaria prevention and control interventions. The malaria-only approach is being used in Zamfara to evaluate whether malaria SBC is more

[a]While the non-personnel expenditure data classified Ebonyi as a malaria state, data shared by Breakthrough ACTION shows there were personnel costs for integrated SBC allocated to Ebonyi.

TABLE 1 POPULATION AND HEALTH INDICATOR DATA

INDICATOR	ZAMFARA	KEBBI	SOKOTO
Total state population estimated for 2020*	5,196,584	5,085,500	5,697,540
Project LGAs/Total LGAs	5/14	11/21	11/23
Project wards/Total wards	36/147	122/225	118/224
Fertility rate	6.4	6.5	7.0
Percent of women using modern family planning	6.7%	3.2%	2.1%
Under 5 mortality rate (per 1,000 live births)	130	252	197
Percent women with skilled ANC care at last pregnancy	35.2%	14.7%	24.3%
Percent women last delivered with skilled provider	12.5%	3.4%	9.2%
Percent children 12–23 months with all basic vaccinations	7.4%	6.3%	4.6%
Percent of children under 5 years with fever in past 2 weeks	13.9%	38.9%	32.7%

*Estimated based on 2016 census data and annual growth projections based on data from 2006 to 2016.

cost-effective as a stand-alone approach or through an integrated approach.

Breakthrough ACTION's plan seeks greater integration of SBC programs.[5] While SBC programs can target multiple behaviors in the same geographic area through independent vertical programs (e.g., malaria, FP, ANC), proponents of integrated SBC believe that integrating messaging across multiple health areas is preferable. Integrated approaches can segment audiences and sequence and layer SBC approaches to change multiple behaviors based on common determinants of health outcomes without overloading an area with SBC, as could be the case with multiple vertical approaches. As such, proponents also believe that integration can result in efficiencies in the design and implementation of SBC programs that will lead to more cost-effective programming, a belief that underlying economic theory supports.[6] However, robust studies of integrated SBC approaches are still scarce and such claims are largely unproven.[7–9] Broader reviews on the cost-effectiveness of SBC programming have not touched on integration issues specifically.[10,11]

The Breakthrough partnership presents a unique opportunity to combine rigorous research design with state-of-the-art SBC programming to address that identified evidence gap. Breakthrough ACTION's programming in Nigeria runs from 2018 to 2022. At the conclusion of the study (September 2022), the cost-effectiveness analysis will evaluate whether integrated SBC programming was more cost-effective than malaria-only programming for malaria in Nigeria. The first key component of the cost-effectiveness analysis is to understand the costs associated with the initial phase of the program from April 2018 to December 2019.

STUDY OBJECTIVES

The primary objective of this analysis is to ascertain the costs for the initial stage associated with integrated vs. vertical (malaria-only) SBC programming in the Nigerian states of Kebbi, Sokoto and Zamfara as implemented by Breakthrough ACTION and its partners. The initial costing allows for the costing team to examine the available data sources and differentiate between design and implementation costs during this critical period through staff interviews before too much time as passed. Additionally, it allows the costing team to identify areas for further refinement in data collection going forward.

The results from this report will be combined with subsequent costing from January 2020 through the program end to calculate total costs. The costs will then be combined with the results from the program effectiveness study being conducted under Breakthrough RESEARCH to assess cost-effectiveness of the integrated SBC interventions relative to malaria-only SBC interventions. The secondary objectives of this report are the following:

- Calculate the initial design costs and amortize to each state and over the life of the project,
- Establish the methodology for analyzing Breakthrough ACTION-Nigeria's expenditure data, and
- Identify the main program components that drive costs and expenditures in the initial stage of SBC programming.

METHODS

General costing approach

The overall framework for the costing approach is detailed in Breakthrough RESEARCH's Guidelines for Costing of Social and Behavior Change Health Interventions,[2] which were developed to provide guidance on how to cost the design and implementation of SBC programming. The guidelines include 17 principles of design, data collection, analysis, and presentation that build on the Global Health Cost Consortium Reference Case for Estimating the Costs of Global Health Services and Interventions (**Box 1**).

SBC program component classification

Breakthrough ACTION-Nigeria's expenditure data were disaggregated into 10 program components which were then broadly categorized into two areas—program activities and program support—based on initial consultations with Breakthrough ACTION-Nigeria program management and finance administration staff. Seven components—human-centered design (HCD), advocacy, capacity strengthening, community SBC, community messaging using mass media (including radio and mobile digital media), long-lasting insecticidal net (LLIN) campaign, and a provider behavior change initiative were categorized as program activities. It should be noted that the HCD component contributed to the development of the other six components; as such HCD-related expenditures were distributed across those six components. Thus, the six program activity components are:

- **Advocacy** activities involve outreach to opinion leaders and community influencers at state and local government area (LGA) levels. In the integrated states, this takes place via the SBC Advocacy Core Group approach, which is designed to garner the active support and participation of key opinion leaders on priority health issues. In the malaria-only state (Zamfara) Breakthrough ACTION is helping the State Malaria Elimination Program to strengthen its Advocacy, Communication, and Social Mobilization subcommittee there.

BOX 1 PRINCIPLES FOR HIGH-QUALITY SBC COSTING

Study Design

- Purpose
- Perspective
- Cost types
- Cost units
- Time horizon

Resource Use Measurement

- Scope of costing
- Measuring & allocating resource use
- Sampling
- Measuring units of output
- Timing of data collection

Pricing and Valuation

- Sources of price data
- Valuing capital inputs
- Discount, inflation & conversion rates
- Shadow prices

Analysis

- Cost functions
- Uncertainty
- Transparency

- **Capacity strengthening** activities focus on building capacity of state, local government, community volunteers and implementing partner staff to carry out (develop and implement) and sustain SBC interventions. Capacity strengthening activities included ward development committee (WDC) and public sector capacity strengthening at state and national levels.
- **Community SBC** comprises ongoing community health dialogues with compound meetings, household visits, referrals, and other direct health

messaging and engagement within communities to directly influence individual and household health behaviors. Activities that fall under community SBC were the same for both malaria-only and integrated SBC models. These activities included household visits, compound meetings, and community dialogues.

- **Community messaging** (radio programming and mobile digital) involves complementary integrated SBC messaging through mass media—primarily the Albishirin Ku! Radio program—that will cover an entire state, mid-media (e.g., billboards), and mobile/digital media. The mobile digital campaign, consisting of Airtel 3-2-1, mobile games, and digital referrals, aims to reach specific populations with complementary integrated SBC messaging, primarily on an "opt-in" basis by tuning into radio programming or accessing digital mobile services.
- **LLIN campaign** includes the SBC activities conducted prior to, during, and after the mass LLIN distribution campaign and will be implemented in both malaria-only and integrated SBC models. The SBC activities include community SBC and community messaging primarily on the benefits of insecticide treated net use as part of the LLIN campaign, but does not include the cost of LLIN commodities or distribution costs.
- **Provider behavior change** initiative, conducted in both the malaria-only and integrated areas, focused on understanding context specific barriers to malaria diagnosis and treatment, appropriate solutions in the form of basic emergency fever case management curricula, and conducting training of public sector health providers to improve quality of malaria case management. In the initial stages of the integrated SBC model, provider behavior change, and fever management activities developed using a behavioral economics framework focused on the design and implementation of prototypes of care to improve malaria test adherence in primary health care centers.

The three program support components are **operations**, **monitoring and evaluation** (including knowledge management), and **strategic coordination**, all of which provide technical and organizational support shared across program components outlined above. Operations costs include those associated with general administration and management, utilities, building rental, and transportation/vehicle maintenance. Monitoring and evaluation activities involve formative research assessments and program monitoring through omnibus surveys to document and improve program implementation. Strategy and coordination includes costs associated with strategy development and coordination activities with sub-partners, USAID, donors, and government. For example, coordinated workplan development and technical assistance to government in assisting with SBC-related strategies. **Figure 1** shows the conceptual mapping of program activity and support components. Costs designated as human centered design were allocated to the six program activities based on the proportion of overall costs.

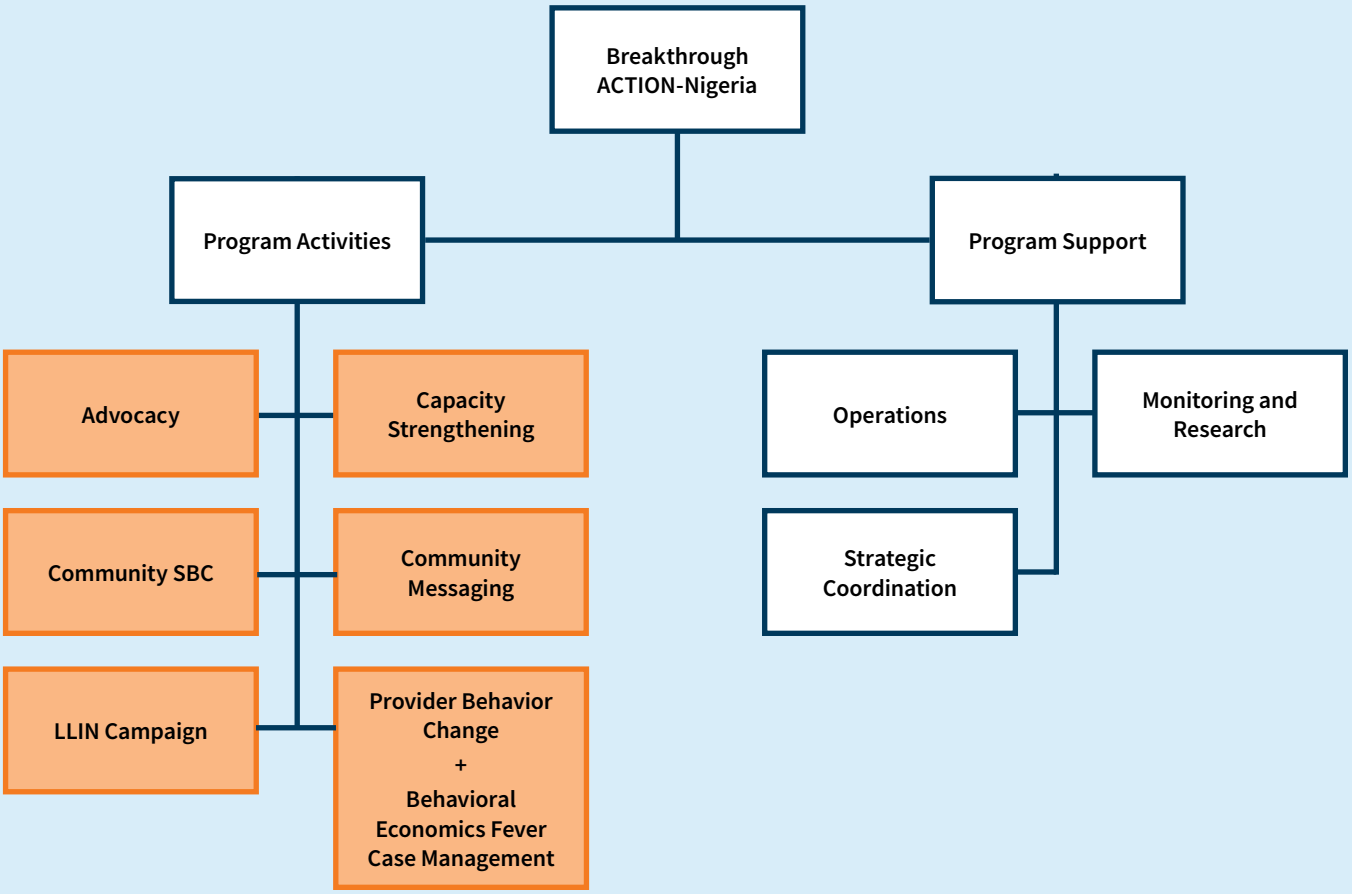
Data collection

Data collection was carried out between August 2018 and December 2020. The data collected included:

- *Review of Breakthrough ACTION-Nigeria (prime and sub-partner) expenditure data.* To assign a cost to those direct and indirect resources attributable to the project activities, the analysis draws on expenditure data from Breakthrough ACTION's financial management system. We also draw on expenditure data to estimate shared national- and international-level program activity and program support/management and operations costs.
- *Semi-structured interviews with Breakthrough ACTION and sub-partner program and financial staff involved in SBC programming.* Between November 2019 and December 2020, interviews were conducted with 12 members from Breakthrough ACTION-Nigeria and sub-partner staff involved in the initial stage of SBC design and implementation. These semi-structured interviews solicited information on steps in the initial SBC activities, timelines, and types and amounts of resources utilized (staff and consultant time, travel, materials, workshops, research, etc.).

Three different datasets are used to generate the analysis. First, the database of Breakthrough ACTION **non-personnel expenditures** from April 2018 through December 2019 was provided by Breakthrough ACTION, which delineates non-personnel expenditures program activity vs program support components and expenditure type/description. It is important to note that these non-personnel expenditures were partially based on charge codes from their financial information management system which evolved during the initial stage of

FIGURE 1 PROGRAM ACTIVITY AND SUPPORT COST COMPONENTS*



*Note that human-centered design costs were spread to the six program activities in orange.

the organization's work. Breakthrough ACTION program directors and financial teams complemented the allocation using institutional as well as program records and knowledge to align expenditures with program activity and support components as best as possible.

Second, personnel costs were removed from the expenditure database at the request of Breakthrough ACTION for salary-related confidentiality reasons. As such, a tool was developed to collate expenditure data where Breakthrough ACTION could input information on salaries, the level of effort (LOE) of staff spent on malaria-only vs. integrated programming, location, and within those program areas, level of effort on direct and support services. The direct services correspond to program activities while support services correspond to program support. This estimated salary and LOE were then aggregated to form the second dataset of the Breakthrough ACTION **personnel expenditures**.

Through communication with sub-partner organizations, a third dataset was developed for Breakthrough ACTION **sub-partner expenditures**, which includes direct and indirect costs by cost categories specific to the study states—Kebbi, Sokoto, and Zamfara. **Table 2** (next page) summarizes the three data sources and their attributes. Based on their different characteristics, these three data sources were complementary in estimating and allocating program costs.

Analysis

Leveraging these three datasets, the objective is to calculate the total costs for the initial period of Breakthrough ACTION-Nigeria project (April 2018–December 2019) and to provide data on the allocation of costs by design vs. implementation phases, as well as by the main program activity and program support component of each of the

TABLE 2 DATA SOURCES

DATA SOURCE	DATA COLLECTION	VARIABLES
Breakthrough ACTION non-personnel expenditures	Obtained from Breakthrough ACTION based on financial management system, institutional program records, and program management staff informed estimates. (Data received in August 2020)	State Date Account code (e.g., training, travel) Activity (e.g., LLIN campaign) Category (e.g., operations)
Breakthrough ACTION Personnel costs	Aggregation tool developed by Avenir Health and completed by Breakthrough ACTION. (Data received in November 2020)	Location Malaria-only or Integrated Direct or Support Design or Implementation
Sub-partner expenditures	Interviews and correspondence with 5 sub-partners* (Data received between November 2020 and January 2021)	State Direct or support Cost type (e.g., personnel, travel)

*Sub-partners include CCSI, Save the Children International, ThinkPlace, Ideas42, and Viamo

two SBC models for each of the three study states. To achieve this, calculations were conducted in Microsoft Excel using the following steps:

Step 1: Summarize design vs. implementation phase in personnel costs. Design/pre-implementation phase of activities are primarily program activities that include understanding the context and engaging government and community partners as well as key stakeholders. Examples of activities that fall under the design phase of SBC programming include situation analysis, needs assessment, meetings to secure stakeholder buy-in, and identify and incorporate feedback all of which inform how SBC programming eventually reaches targeted communities. In addition, specific capacity strengthening activities related to the preceding activities are also considered as SBC design programming, including developing training curricula for workshops to build state and LGA staff capacity to conduct needs assessments and develop messages. HCD costs were also included as part of the design phase. The implementation phase refers to those aspects of the program activities that involve direct engagement with community members including mass media campaigns, community advocacy to leaders and community influencers, and health provider behavior change.

Breakthrough ACTION personnel costs were first allocated by finance and management staff by SBC model—malaria-only vs. integrated—and then allocated by costs associated with design and implementation phase activities, using aggregate estimates of the level of effort and salaries of each Breakthrough ACTION staff member. Next, these personnel costs were apportioned into aggregate program activity components as well as aggregate program support components. After separating into program activity and support costs, Breakthrough ACTION staff further allocated personnel costs across the 10 states in which Breakthrough ACTION's SBC programming was implemented during the initial stage (August 2018–December 2019).

Although this study has a specific focus on three states (Kebbi, Sokoto, and Zamfara), it was necessary to allocate costs across all 10 states supported by the Breakthrough ACTION project to appropriately apportion shared above-state costs incurred through Abuja/national office and Baltimore/headquarters office. Those shared above-state personnel costs were allocated to each state by assigning a weight using each state's direct personnel costs divided by the aggregate direct personnel costs for all 10 states. With these estimated allocations, the Abuja/national and Baltimore/headquarters personnel costs were apportioned by state. With this last step, all personnel costs for the three study states were apportioned by SBC model (malaria-only or integrated), phase (design or implementation), and then into broader program activity or program support costs.

Step 2: Summarize activity breakdown in non-personnel expenditures for Breakthrough ACTION for each state. Using financial data and program institutional records, Breakthrough ACTION non-personnel expenditures were divided into program activities or program support components. Costs associated with program activities were further disaggregated into Breakthrough ACTION-Nigeria's six program activity components and costs associated with program support were similarly allocated across the three program support components. This second allocation step involved applying weights to each component for each program component category—program activity and program support costs. The program activity weight was based on the estimated cost of each of its six program components divided by the total cost of all program activity costs. Likewise, program support component weighting was calculated for each of the three program support components divided by the aggregate of the program support components.

Step 3: Summarize sub-partners' costs. Data collected from five sub-partners were totaled and summarized by malaria-only vs. integrated programming by program activity as well as by program support for each of the three study states. Most sub-partners provided data disaggregated for the three study states by SBC model, phase (design or implementation) and by program activity or program support. Where data were provided without disaggregation (by any or a combination of state, phase, or program components), these data were allocated using the processes outlined in steps 4 and 5.

Step 4: Use personnel data percentages to allocate non-personnel expenditures. To allocate program activity and program support costs into SBC models (malaria-only and integrated-related costs), phase (design and implementation), and then state (Kebbi, Sokoto, and Zamfara), we used the reported distribution of personnel costs which were provided by SBC model, state, and phase. In other words, the reported data for each of the six program activity components and the three program support components were allocated into each study state's personnel cost share by SBC model and phase. For example, program activity costs were allocated by phase in Zamfara using Zamfara's allocated design and implementation personnel costs relative to the total personnel program activity costs. This allocation method using personnel share of costs by SBC model, phase, and state was applied to distribute program activity and program support components for malaria-only SBC design and implementation costs specific to Zamfara as well as integrated SBC design and implementation specific to Kebbi and Sokoto states.

Step 5: Use non-personnel expenditure percentages to allocate personnel costs. To allocate reported personnel direct costs into the six program activity components we applied the reported distribution of each program activity component relative to the total program activity cost. For example, personnel costs were allocated to the advocacy component using the advocacy share of total program activity costs as reported by Breakthrough ACTION finance and management staff. Likewise, personnel support costs were allocated into the three program support components using the share each support component of the total program support costs. Using a similar example, the personnel support costs were allocated to operations costs by using the reported operations share of all program support costs. The proportions of program activity and program support costs are shown in the results section.

Step 6: Use total program costs and targeted reach to estimate unit costs. Unit costs were calculated for each state for two program activities where data was available: community messaging (radio and digital media) and community SBC. The total cost for each activity in each state include program activity costs and program support costs. To calculate the unit costs, we used the state population for 2020 (see Table 1).[b] The total activity costs (numerator) were then divided by the number of people aged 15–49 that comprise the target population reached (denominator) to come up with the estimated unit cost.

[b]State populations for 2020 were based on 2016 projections with an annual increase from 2016 to 2020 based on the pattern of increases seen from 2006 to 2016.

RESULTS

The results described are presented for the following purposes, to: 1) outline the overall project costs by data source, 2) calculate the study state personnel costs by SBC model, by phase (design vs implementation), and program activity vs program support, 3) calculate the study state non-personnel share of costs presented along the six program activity and three program support components, 4) calculate the specific cost for the three study states by SBC model, phase, and program components, and 5) estimate preliminary unit costs for program reach within each study state.

Total costs by data source

At its initial stage (April 2018–December 2019), the cost data relevant to the study totaled approximately $16.97 million, a subset of which were allocated to the three study states. **Table 3** breaks down the costs by the three data sources.

TABLE 3 BREAKTHROUGH ACTION-NIGERIA SBC COST DATA, APRIL 2018–DECEMBER 2019 BY DATA SOURCE*

DATA SOURCE/ CATEGORY	MALARIA-ONLY	INTEGRATED	TOTAL
Breakthrough ACTION non-personnel program costs	$3,888,285	$5,570,781	$9,459,066
Breakthrough ACTION personnel	$2,649,781	$3,665,227	$6,315,000
Sub-partners (specific to Kebbi, Sokoto, and Zamfara states)	$154,220	$1,039,222	$1,193,442
TOTAL	$10,275,231	$6,692,286	$16,967,517

*Costs in Naira are presented in Appendix Table A1.

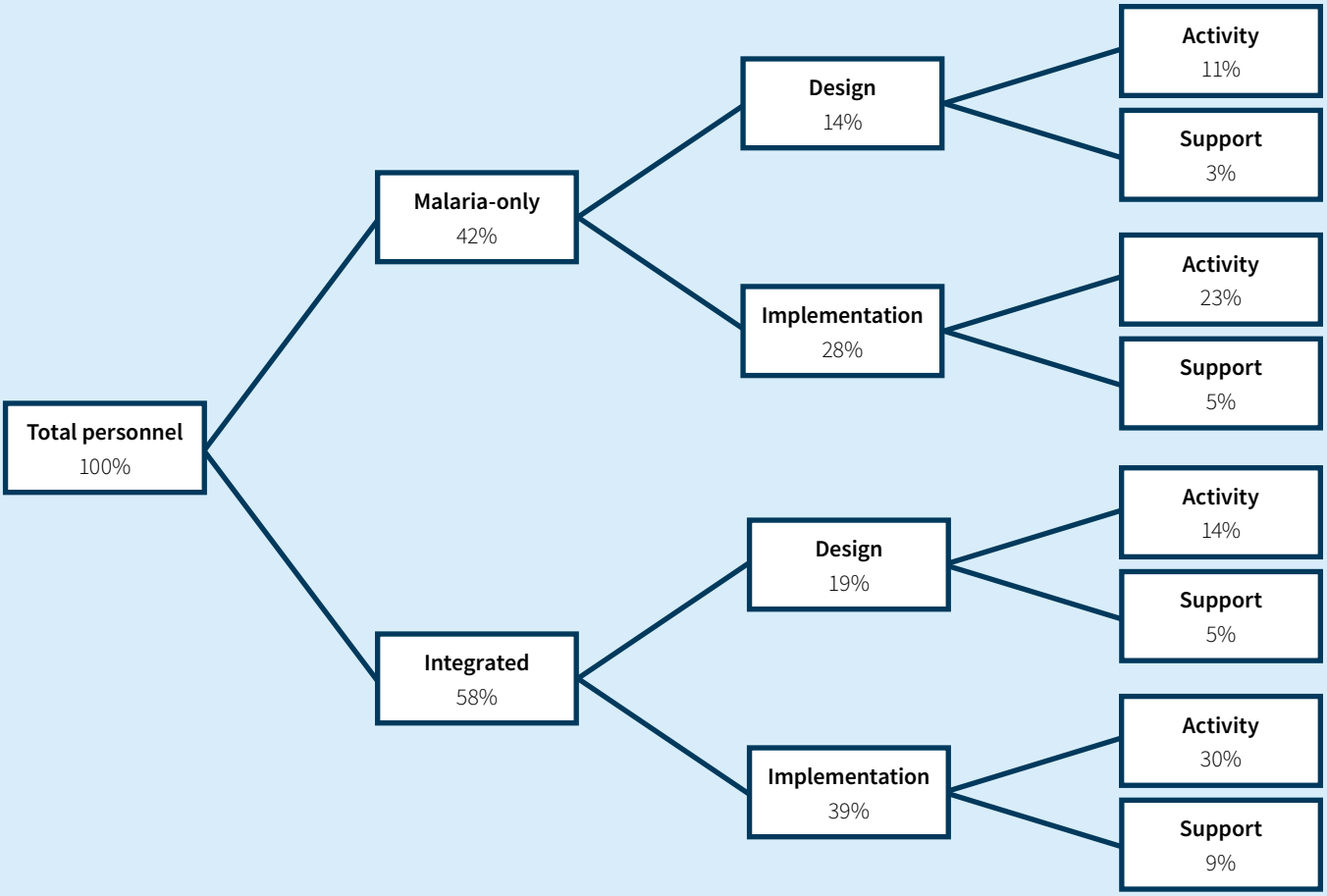
Personnel costs

Figure 2 shows the breakdown of Breakthrough ACTION personnel costs of the malaria-only program and the integrated program by phase (design vs implementation) and program (activity vs support). More personnel costs (58%) were expended for integrated programming than for malaria-only (42%), and in both SBC models, most personnel costs were invested in implementation compared to the design phase. Of the 58% of total personnel costs spent on integrated SBC programming, implementation costs (39% of total personnel costs) were more than twice the cost of design (19% of total personnel costs). Of the 42% of personnel costs spent on malaria-only SBC programming, implementation costs represent 28% of total personnel costs and were also twice as much as design costs, which account for 14% of personnel costs.

Across both SBC models' personnel costs for design and implementation, program activity costs were more than program support costs. Of the 19% of personnel costs spent during the design phase of the integrated SBC model, program activity represents 14% of all personnel costs while program support (operations, monitoring and evaluation, and strategy and coordination) represents only 5% of all personnel costs. Of the 39% of all personnel costs spent on the implementation phase of the integrated SBC model, program activity accounts for 30% of all personnel costs, while program support accounts for 9%. In the malaria-only SBC model, the 14% of personnel costs in the design phase was split into program activity (11%) and program support (3%). Similarly, program activity accounts for 23% of total personnel expenditures on the implementation phase of the malaria-only SBC program compared to 5% share of the total personnel spent on the program support.

It is important to note that while total personnel expenditures during the initial stage of Breakthrough ACTION-Nigeria's programming follow the proportions outlined in Figure 5, the proportion of personnel costs allocated to each state varies primarily by SBC model and, as explained in the methodology, the cost inputs from implementing sub-partners. In the study states, the two states where integrated SBC model was rolled out, Kebbi and Sokoto, were each allocated 16% of total personnel costs while Zamfara state was allocated 6% of total personnel costs. In other words, Zamfara state personnel costs account for 6% of all Breakthrough ACTION personnel costs but within Zamfara state, the majority of personnel costs follow the proportions outlined for malaria-only SBC personnel costs, i.e., Zamfara spent approximately 33% on design costs which is the

FIGURE 2 BREAKDOWN OF BREAKTHROUGH ACTION–NIGERIA PERSONNEL COSTS



equivalent of the comparative share of Breakthrough ACTION's design (14%) and implementation costs (28%) for all malaria-only SBC states. Similarly, both Kebbi and Sokoto spent approximately 33% on design costs which is the equivalent of the comparative share of Breakthrough ACTION's design (19%) and implementation costs (29%) in integrated SBC states.

Non-personnel program costs

Breakthrough ACTION-Nigeria spent approximately $9.5 million on non-personnel program costs, of which program activity represented 66% and program support represents 34%. The proportions of expenditures allocated to each of the six program activities and three program support components are shown in **Table 4** (next page).

The proportions were then applied to all personnel and non-personnel program costs provided by Breakthrough ACTION and its implementing sub-partners for all three study states to calculate cost by SBC model and phase, and then further allocated into program activity or program support components.

Costs by SBC model and phase in study states

During this initial stage from April 2018 through December 2019, Breakthrough ACTION-Nigeria SBC program spent a total of $5.5 million associated with the integrated states of Kebbi and Sokoto and the malaria-only state of Zamfara, including the share of Abuja and Baltimore costs attributed to each state. The initial costs of an integrated approach that builds on a wide array of social and behavior change interventions is higher than the cost of the malaria-focused approach in Zamfara. **Tables 5** (next page) breaks down the costs for the three states by model, phase, and program.

TABLE 4 BREAKDOWN OF BREAKTHROUGH ACTION-NIGERIA NON-PERSONNEL PROGRAM COSTS BY COMPONENT*

ACTIVITY COMPONENTS	PROPORTION %	SUPPORT COMPONENTS	PROPORTION %
Advocacy	2	Operations	80
Capacity strengthening	7	Monitoring & research (knowledge management)	7
Community SBC	61	Strategy & coordination	13
Mass media + mobile digital	13		
LLIN campaign	12		
Provider behavior initiative and behavioral economics fever case management	6		

*Program components are described in the Methods section under "SBC Program Component Classification."

TABLE 5 TOTAL COSTS BY SBC MODEL, PHASE, AND STUDY STATE*

	MALARIA-ONLY SBC		INTEGRATED SBC			
	ZAMFARA		KEBBI		SOKOTO	
	DESIGN	IMPLEMENTATION	DESIGN	IMPLEMENTATION	DESIGN	IMPLEMENTATION
Program activity component						
Advocacy	$2,460	$7,205	$9,199	$17,536	$6,073	$17,353
Capacity strengthening	$9,702	$28,225	$36,285	$69,172	$23,956	$68,450
Community SBC	$87,182	$276,514	$326,042	$621,543	$215,255	$615,056
Community messaging	$18,941	$54,376	$76,299	$164,560	$52,231	$163,150
LLIN	$17,198	$49,372	$66,347	$132,632	$44,493	$131,352
Provider behavior change	$8,268	$23,737	$30,921	$58,946	$20,414	$58,331
Total program activity costs	$143,750	$439,428	$545,093	$1,064,388	$362,423	$1,053,692
Program support component						
Operations	$29,599	$55,589	$161,115	$390,828	$125,735	$384,229
Monitoring and research	$24,715	$43,955	$71,180	$166,589	$68,214	$166,036
Strategy and coordination	$13,671	$43,437	$18,804	$46,456	$12,919	$45,358
Total program support costs	$67,985	$142,981	$251,099	$603,873	$206,867	$595,623
Total costs	$211,735	$582,409	$796,193	$1,668,261	$569,290	$1,649,315

*Costs in Naira are presented in Appendix Table A2

Overall, the design costs are less than half of the cost of implementation in the integrated model and approximately one-third of the cost of implementation in the malaria-only model. Design costs in the Kebbi's integrated SBC model were $796,000 representing 32% of the initial cost, compared to approximately $1.7 million (68%) cost of implementation. In the second integrated SBC study state, Sokoto, implementation costs of $1.6 million were almost the same as in Kebbi but accounted for a larger share (74%) of the initial costs compared to design cost of $569,000 (26%). The design costs in Zamfara were $212,000 or 27% of initial cost of the state's malaria-only SBC program while the implementation costs came to $582,000 (77%).

Costs by program category and components

When costs are disaggregated by program activity vs. program support costs, program activity expenditures are higher than expenditures on program support for

both SBC models. In Zamfara, program activity costs accounted for a substantially larger share (73%) of costs when compared to program support costs (27%). The program activity share of integrated SBC model accounts for both Kebbi and Sokoto states are virtually the same proportion of total costs in each state at 65% and 64%, respectively. Likewise, program support costs account for an average 35% of Kebbi's SBC program and 34% of Sokoto's SBC program expenditures.

Disaggregating the total cost of the malaria-only program by activity component, the cost of the community SBC component represents the largest share at 46%, followed by community messaging (9%), LLIN campaign (8%), capacity strengthening (5%), with provider behavior change (4%) and advocacy (1%) representing the smallest proportion of total cost. On the program support side, operations had the highest cost (11%), followed by monitoring and research (9%), and strategy and coordination (7%).

The breakdown of costs for Kebbi and Sokoto follow very similar proportions by program activity and program support components. We averaged the total cost of integrated SBC programming across Kebbi and Sokoto states. Looking at program activity components, the community SBC component of expenditures accounts for the largest share of total program costs at 38% (38% in Kebbi and 37% in Sokoto). This is followed by LLIN campaign (8%), provider behavior change (4%), capacity strengthening (4%), and advocacy (1%). Program operations account for the second largest share of total program costs at an average of 23% (22% in Kebbi and 23% in Sokoto), while community messaging as well as monitoring and research each account for 10% of total costs in each state. Strategy and coordination accounted for 3%. The distribution of program component share of each state's total costs is presented for design and implementation are presented in **Table 6**.

TABLE 6 DISTRIBUTION OF COSTS BY SBC MODEL, PHASE AND STATE

	MALARIA-ONLY			INTEGRATED					
	ZAMFARA			KEBBI			SOKOTO		
	DESIGN %	IMPLEMENTATION %	TOTAL %	DESIGN %	IMPLEMENTATION %	TOTAL %	DESIGN %	IMPLEMENTATION %	TOTAL %
Advocacy	2	1	1	1	1	1	1	1	1
Capacity strengthening	6	6	6	5	4	4	4	4	4
Community SBC	58	56	56	41	37	38	38	37	37
Community messaging	13	11	11	10	10	10	9	10	10
LLIN	11	10	10	8	8	8	8	8	8
Provider behavior change	6	5	5	4	4	4	4	4	4
Operations	2	5	4	20	23	22	22	23	23
Monitoring and research	2	3	3	9	10	10	12	10	11
Strategy and coordination	1	3	3	2	3	3	2	3	3

Note: That total columns in this table represents the total share of each program component's total (design and implementation) component for each state divided by the total cost in each state.

Costs by SBC model and phase in study states

Table 7 details the unit costs for each state based on the expected program reach for community messaging (radio and digital interventions) and community SBC. For community messaging, Breakthrough ACTION targeted 60% of the adult population age 15 to 49, whereas the targeted population for the unit costs per target reach were $0.07 in Zamfara, $0.21 in Sokoto, and $0.26 in Kebbi. Community SBC unit costs per target were $1.95 in Sokoto, $2.04 in Zamfara, and $2.44 in Kebbi.

TABLE 7 ESTIMATED UNIT COSTS BASED ON TARGETED REACH

	MALARIA-ONLY	INTEGRATED	
	ZAMFARA	KEBBI	SOKOTO
Community messaging			
Percent of population age 15–49 targeted	60%	60%	60%
Estimated reach (based on targets)	1,459,512	1,428,313	1,600,210
State-level costs	$99,840	$368,806	$337,434
Unit costs per target reach	$0.07	$0.26	$0.21
Community SBC			
Percent of population age 15–49 targeted	10%	25%	25%
Estimated reach (based on targets)	243,252	595,130	666,754
State-level costs	$495,264	$1,450,951	$1,300,835
Unit costs per target reach	$2.04	$2.44	$1.95

DISCUSSION

Key findings

The analysis of the initial cost and expenditure data for the three study states of the Breakthrough ACTION-Nigeria project yielded four key findings. First, the design costs associated with the initial phase of the program were between a quarter and a third of the total costs (26% in Sokoto, 27% in Zamfara, and 32% in Kebbi). However, through conversations with Breakthrough ACTION-Nigeria staff, we learned that the "design phase" of SBC in this region is not one discrete phase at the beginning of the project, but rather continues to adapt and evolve based on emerging SBC needs in the states so continued design costs are expected as the project progresses. Still, we expect that the design share of total expenditures is largely front-loaded at this initial stage of the project's lifetime and is expected to decline in the subsequent study years, which we expect to observe at the endline.

A second key finding is that if expenditures on study states are representative of overall project expenditures, state-level cost for the integrated SBC model (an average of $2.3 million per state) are considerably higher than for the malaria-only model ($794,000 per state). This difference in expenditure is expected primarily due to a difference in scale, with more than twice the number of individuals being targeted in the integrated states compared to the malaria-only states. Additionally, the integrated program has increased needs for the integrated SBC, which covers multiple health areas. This is demonstrated by a greater proportion of resources for program support for the integrated model (35%), where many program support cost elements for a new program (as illustrated by Kebbi and Sokoto examples of newly implemented integrated SBC) are capital-intensive during the early stages (for example, leasing and renovating a building, buying a project car, purchasing data collection and monitoring instruments like phones and tablets). On the other hand, program support in the malaria-only model which has a lower share of costs (27%) because it has been in operation prior to 2018 with existing capital investments.

Third, the estimated unit costs for community messaging and community SBC are interesting to compare at this point in the project. The community messaging unit costs are somewhat lower for Zamfara at $0.07 compared to $0.21 in Sokoto and $0.26 in Kebbi, which may reflect the increased resources needed for designing integrated SBC messages. While these unit costs are based on the targeted reach for those aged 15–49, Breakthrough ACTION-Nigeria has indicated that the actual number of individuals exposed to the messaging may be considerably higher, based on Omnibus survey findings, and thus the unit costs would be lower. For the community SBC activities, Sokoto has the lowest unit costs of $1.95 per expected targeted because they reached the largest number of people at a lower cost. The cost per person reached is slightly higher than for the malaria-only approach in Zamfara at $2.04. The unit cost in Kebbi is the highest at $2.44 per person reached which was fewer overall than Sokoto and at a higher total cost. For both of these activities, the actual reach can better be determined based on exposure variables from the midline evaluation and revised unit costs can be calculated accordingly.

Finally, when looking at the main cost drivers in the integrated vs. malaria-only programs, we see the largest cost driver during this period is the community SBC activities, which include a wide array of activities that require household visits and community meetings with their associated activity costs (e.g., supervision, meetings, trainings, travel, per diems, materials and supplies) These activities clearly take center stage in Breakthrough ACTION's programming. In anticipation of examining the 2020–2021 data, we expect there to be changes in these costs that reflect the complexities of retooling these activities in response to the COVID-19 pandemic. For the cost-effectiveness analysis, it will be important to estimate COVID-related costs that can include planning and implementation of SBC focused on COVID-related behaviors (such as mask wearing and social distancing), personal protective equipment, and inflation for program inputs. Since COVID-related outcomes are not included in the evaluation framework, any costs related to COVID SBC activities will also not be included in the cost-effectiveness calculations.

Study limitations

There are some limitations to the current study that will be important to consider when interpreting results and designing similar studies in the future. First, there were challenges accessing the data for this analysis. Primary data collection was carried out by Breakthrough ACTION-Nigeria staff using a financial information management system that had to be adapted to capture the different categories (for example, design vs implementation phases) that were the focus of this study. This adaptation involved allocating costs using institutional records and the best estimates of program management and financial administration staff, which required considerable effort and time. The process was further delayed by the global COVID-19 pandemic which resulted in challenges with coordinating the data collection process.

Second, allocating costs to program activity vs. program support components were based on a combination of expenditure data from Breakthrough ACTION's financial information management system, institutional records and best-informed estimates made by the program management and finance staff from Breakthrough ACTION and its implementing sub-partner organizations for earlier periods prior to revisions made to the financial reporting system for this activity. This was done to ensure an efficient data collection process but are likely subject to reporting bias. In addition, there are also costs associated with certain program activities (e.g., LLIN campaign training workshops) that are shared across states with malaria-only programming as well as states with integrated programming that could only be allocated equally. While this represents the best available allocation method, it may not be the most accurate representation of the cost-sharing across states in terms of impact.

Lastly, the Breakthrough ACTION-Nigeria program works in 12 states, while the cost data presented here are primarily limited to the three study states where the effectiveness analysis is being conducted. As such, the costs reflected here may not be wholly representative of Breakthrough ACTION-Nigeria's SBC programming work.

Conclusions

The data presented here serve as an initial look at the costs of the Breakthrough ACTION-Nigeria SBC program in the study states and thus serve as a key first step in preparing the cost-effectiveness analysis comparing the integrated and malaria-only models. As these cost data are supplemented with expenditure data from subsequent years, MNCH-related service delivery costs and the effectiveness evaluation, we will be able to examine the cost effectiveness of the integrated SBC model relative to the malaria-only model.

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APPENDIX

TABLE A1 BREAKTHROUGH ACTION-NIGERIA SBC COSTS APRIL 2018 – DECEMBER 2019 BY DATA SOURCE*

DATA SOURCE/CATEGORY	INTEGRATED	MALARIA-ONLY	TOTAL
Breakthrough ACTION non-personnel program costs	₦1,608,841,553	₦1,122,936,708	**₦2,731,778,261**
Breakthrough ACTION personnel	₦1,058,517,558	₦765,256,753	**₦1,823,772,000**
Implementing sub-partners (specific to Kebbi, Sokoto, and Zamfara states)	₦300,127,314	₦44,538,736	**₦344,666,050**
TOTAL	**₦1,932,732,197**	**₦2,967,486,713**	**₦4,900,218,910**

*Costs were calculated using conversion rate of $1 = ₦288.80

TABLE A2 TOTAL COSTS BY SBC MODEL, PHASE, AND STUDY STATE*

	MALARIA-ONLY SBC		INTEGRATED SBC			
	ZAMFARA		KEBBI		SOKOTO	
	DESIGN	IMPLEMENTATION	DESIGN	IMPLEMENTATION	DESIGN	IMPLEMENTATION
Program activity component						
Advocacy	₦710,448	₦2,080,804	₦2,656,671	₦5,064,397	₦1,753,882	₦5,011,546
Capacity strengthening	₦2,801,938	₦8,151,380	₦10,479,108	₦19,976,874	₦6,918,493	₦19,768,360
Community SBC	₦25,178,162	₦79,857,243	₦94,160,930	₦179,501,618	₦62,165,644	₦177,628,173
Community messaging	₦5,470,161	₦15,703,789	₦22,035,151	₦47,524,928	₦15,084,313	₦47,117,720
LLIN	₦4,966,782	₦14,258,634	₦19,161,014	₦38,304,122	₦12,849,578	₦37,934,458
Provider behavior change	₦2,387,798	₦6,855,246	₦8,929,985	₦17,023,605	₦5,895,563	₦16,845,993
Total program activity costs	**₦41,515,000**	**₦126,906,806**	**₦157,422,858**	**₦307,395,543**	**₦104,667,474**	**₦304,306,250**
Program support component						
Operations	₦8,548,191	₦16,054,103	₦46,530,012	₦112,871,126	₦36,312,268	₦110,965,335
Monitoring and research	₦7,137,692	₦12,694,204	₦20,556,784	₦48,110,903	₦19,700,203	₦47,951,197
Strategy and coordination	₦3,948,185	₦12,544,606	₦5,430,595	₦13,416,493	₦3,731,007	₦13,099,390
Total program support costs	**₦19,634,068**	**₦41,292,913**	**₦72,517,391**	**₦174,398,522**	**₦59,743,478**	**₦172,015,922**
Total costs	**₦61,149,068**	**₦168,199,719**	**₦229,940,250**	**₦481,794,066**	**₦164,410,952**	**₦476,322,172**

*Costs were calculated using conversion rate of $1 = ₦288.80

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