Final Report

A360 Design Costing Report

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Authors: James E. Rosen[1] and Michelle Weinberger[1]

[1]Avenir Health

Submitted by Itad

In association with Avenir Health

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Disclaimer

The views within this document are entirely those of the cost-effectiveness evaluation team. They do not represent any of the individuals and organizations referred to in the report.

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List of Acronyms

A360	Adolescents 360
BMGF	Bill & Melinda Gates Foundation
CIFF	Children's Investment Fund Foundation
HCD	Human-Centered Design
HQ	Headquarters
LGA	Local Government Area, Nigeria
MMA	Matasa Matan Arewa
NDA	Non-Disclosure Agreement
SFH	Society for Family Health, Nigeria

Executive Summary

Background and Objective

This document reports results from the costing of the design of interventions under A360a girl-centred approach to contraceptive programming. A360 operated four interventions in three countries: Smart Start in Ethiopia, Matasa Matan Arewa (MMA) in Northern Nigeria, 9ja Girls in Southern Nigeria, and Kuwa Mjanja in Tanzania. Design activities took place in 2016-17; intervention optimization and scale-up in 2018-2020. The design costing complements costing of implementation of the four interventions, whose results are reported separately. The costing is an input to a forthcoming cost-effectiveness analysis that will gauge costs in the context of program outputs and impact.

Methods

The study included costs of PSI and its partners, complementing top-down costing drawing on financial systems with A360 headquarters staff surveys. Periodic processing and analysis of data took place from 2016 to 2020. Analysts used information on timing of expenditure and survey responses to distinguish between design costs and costs to create the A360 approach, costs associated with promotion of replication and adoption of the A360 approach, and costs to implement the interventions. Analysts combined information from financial databases and staff surveys to assign spending to one of the three A360 countries, splitting Nigeria costs equally between interventions in Northern and Southern Nigeria. Incremental design costs were calculated by subtracting the costs of PSI's standard DELTA approach from the total A360 design cost. Analysts amortized these incremental costs over a five-year useful life using a straight-line approach, then prorated costs to the outcome evaluation intervention geographies. Sensitivity analyses tested how the results might change with changes in key parameters such as the useful life of the design and assumptions about how to differentiate between design costs and costs to create the A360 approach and replicate/adopt A360.

Results and discussion

A360 spent approximately $8.1 million to design the four interventions, split between $2.6 million for Smart Start in Ethiopia, $2.3 million combined for MMA in Northern Nigeria and 9ja Girls in Southern Nigeria, and $3.1 million for Kuwa Mjanja in Tanzania. These totals are three to nine times higher than the typical cost of $338,546 associated with PSI's standard DELTA design methodology. Amortizing and prorating produced a total incremental design cost in the outcome evaluation geographies of $107,684 (plausible range of $48,791 - $192,840) for the four woredas in Ethiopia, $73,262 ($47,633 - $132,387) for the two Local Government Areas in Northern Nigeria, $39,919 ($12,977 - $72,135) for the Local Government Area in Southern Nigeria, and $15,164 ($6,669 - $26,824) for the district in Tanzania. Design costs in the study geographies are a function of the total cost for each country, the number of geographies where A360 was implemented, the number of geographies selected for the study, and the duration of implementation in each study geography. Analysts addressed important methodological limitations through sensitivity analysis. Whether the more expensive A360 design process was "worth it" in terms of added impact is a question the forthcoming cost-effectiveness analysis attempts to answer.

1 Background and objectives

Adolescents 360 (A360), led by Population Services International (PSI), is a girl-centred approach to contraceptive programming that encompassed a new, multidisciplinary design process and the resulting four interventions in three countries (Ethiopia, Nigeria, and Tanzania) that ran from 2016-2020. This document reports results from the costing of the design of A360, as a complement to the costing of the implementation of the four interventions and as input to a forthcoming cost-effectiveness analysis. Design costs are an under-analyzed and under-reported element in the costing of many health programs. This is partly because program managers and policy makers focus on the budget impact of program implementation rather than design, whose costs they often take as a given. With the global health field incorporating new, more elaborate, and potentially more expensive design methodology, a fuller accounting of design costs is justified. This greater attention to design costs is particularly relevant for analysis of A360, whose human-centered design methodology is believed by proponents to be key to producing greater impact.

The costing forms part of a package of evaluation activities, including an outcome evaluation,[1] process evaluation, and cost-effectiveness analysis. Itad led the A360 evaluation in collaboration with the London School of Hygiene & Tropical Medicine and Avenir Health. Avenir Health led on the costing and cost-effectiveness analysis.

Because design costs are an input to a cost-effectiveness analysis, measuring incremental cost is important. For the purposes of this report, the incremental costs are the difference between the cost of designing A360 and the DELTA design methodology, the standard design methodology PSI used at the time A360 began.[2]

This costing focuses on design costs incurred over a roughly two-year period beginning in 2016 and up until program optimization and scale-up in late 2017. The study estimated design costs for A360 as a whole, for each country, and for the outcome evaluation (study) geographies, a subset of the areas where A360 operated, including 4 woredas in Ethiopia, 2 Local Government Areas in Nigeria, 1 Local Government Area in Southern Nigeria, and 1 district in Tanzania. Design costs for the study geographies fed into a cost-effectiveness analysis. The results will help expand the evidence base on design of adolescent sexual and reproductive health programs.

1.1 Overall background on A360

Although many programs in developing countries have tried to reach adolescents with contraceptive services, their effectiveness has mostly been limited.[3] A360 was a five-year, US$30 million investment to increase modern contraceptive use among girls aged between 15 and 19 years old in Ethiopia, Nigeria, and Tanzania. Proponents of A360 believed it would be more effective than previous adolescent programs by better considering the unique needs of adolescents, and the social, cultural, religious, and economic forces that underlie access to and choices about contraception.

[1] The outcome evaluation focused on four intervention woredas (districts) in Ethiopia; two Local Government Areas in Northern Nigeria; one Local Government Area in Southern Nigeria; and one district in Tanzania.

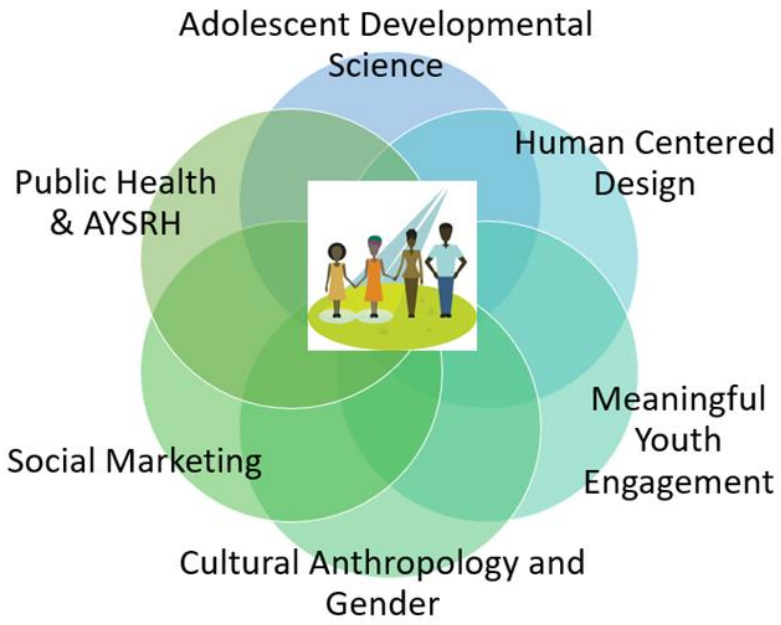
[2] When we refer to DELTA in this report, it includes formative research that feeds into the DELTA country workshop, the country workshop itself, and post-workshop design work including pretesting. For more information on DELTA, see https://www.psi.org/publication/delta-companion/

[3] Chandra-Mouli V, Lane C, Wong S (2015). What does not work in adolescent sexual and reproductive health: a review of evidence on interventions commonly accepted as best practices. Glob Health Sci Pract. 2015;3(3):333-340. http://dx.doi.org/10.9745/GHSP-D-15-00126.

A360 used a multidisciplinary approach to design and scale up programs developed with and for young people. In this report we distinguish between the *creation* of this multidisciplinary approach and the *application* of the approach in designing and implementing specific interventions. This report focuses on the cost to design the interventions, excluding costs to create the approach. The A360 approach combined six disciplines: human-centered design (HCD), social marketing, developmental neuroscience, sociocultural anthropology, public health, and youth engagement (Figure 1).

The Bill & Melinda Gates Foundation (BMGF) and the Children's Investment Fund Foundation (CIFF) funded A360. The project began in January 2016 and ended in September 2020.

Figure 1: A360 disciplines brought to bear on intervention design



Source: Krug et al (2021)

1.2 Description of the A360 design process

After an initial Inception phase to set up the A360 consortium and create the A360 approach, design took place in three phases—Inquiry, Insight Synthesis, and Prototyping.[4] The Inquiry and Insight Synthesis phases took place mainly in 2016, involving formative research and analysis conducted by a team of design experts, implementers and young people. The costing also included some earlier Inquiry and Insight Synthesis activities that took place in 2015 in Tanzania and were funded by a foundation other than BMGF and CIFF. In 2017, designers used insights to develop country-specific prototypes, which they tested and iterated to give rise to four distinct A360 'solutions' (interventions) for Ethiopia, Tanzania and Nigeria (North and South). In the final part of the design phase, the consortium piloted these solutions in late 2017. They then rolled them out, scaling them up and further iterating them during the Adaptive Implementation phase between 2018 and the end of the program in September 2020. The A360 design methodology is a more lengthy and in-depth approach than PSI's DELTA design methodology, the marketing planning tool that PSI traditionally used to design and plan its interventions.

[4] A360 initially referred to the phases using language from IDEO.org's approach to human-centered design: Inspiration, Ideation, Pilot, and Scale. The terminology was adapted in 2019 to improve clarity to wider audiences. The Inspiration phase is equivalent to the Inquiry and Insight Synthesis Phases; the Ideation and Pilot phases are now known as Prototyping, and the Scale phase became Adaptive Implementation.

2 Methods

2.1 Overview of methods

This design costing component of the study used a top-down costing approach, drawing on the routine cost accounting systems of PSI and its partners, supplemented by periodic A360 staff surveys used to distribute joint global costs to countries. Estimates of the design cost in the outcome evaluation geographies were derived from national design costs.

2.2 Study perspective

The choice of perspective or viewpoint determines whose costs to include. Ideally, any costing should adopt the perspective of society, and include all related costs, regardless of who pays for them. This costing took less than a full societal perspective, by including only costs incurred by PSI and its partners. The perspective then is that of the organizations carrying out or funding such a design effort. It counts only financial costs (what someone paid for an input) and not economic costs (for example, the market value of volunteer time or donated space).

The chosen perspective, as agreed with the A360 funders, came from the objective of the cost-effectiveness analysis and its primary audiences. These audiences include program managers in the three study countries and globally who decide on design methodologies, as well as the official aid agencies, foundations, governments or other agencies that fund such programs. These audiences care primarily about how much they need to budget from their own resources. This meant that, for the purpose of the design costing, we focused on costs within the A360 budget. Note that the complementary study on the cost of implementing the interventions in the study geographies captured costs outside the A360 budget such as time of government personnel, donated goods, and volunteer time.

2.3 Geographic scope and outcome evaluation focus

The study includes costs incurred by PSI and its partner organizations internationally and in the three study countries. While the programs operated at scale nationally in several geographies, an outcome evaluation focused on a few, select geographies, where the cost-effectiveness analysis also focused. The design costing estimated a total cost per country, then assigned a prorated cost to the outcome evaluation geographies, including Adea, Fentale, Lume, Wara Jarso woredas in Ethiopia; Doma and Karu Local Government Areas (LGAs) in Northern Nigeria; Ado-Odo Ota LGA in Southern Nigeria; and Ilemela District in Tanzania.

2.4 Time frame and analytic horizon

The costing time frame encompassed design activities in 2016 and 2017, and some pre-A360 HCD work in Tanzania in 2015. The analytic horizon (the period over which the costs that occurred as result of the program were considered) was the same as the time frame.

2.5 Included and excluded costs

Within the chosen perspective, this costing included all inputs that are critical to the success of the A360 design process. A full costing of all relevant inputs gives decision makers the best sense of true costs. Thus, the costing includes all inputs critical to the successful operation of the project, excluding funder

management costs, external evaluation costs, adoption and replication costs, and costs of activities to adopt and replicate A360 in other settings (Table 1). Note that costs include some non-A360 PSI costs incurred in Tanzania in the period just before A360 that are directly related to subsequent A360 work. The study also included relevant PSI program support costs incurred during A360 that were not part of the A360 budget, but that were critical to the functioning of the A360 project.

Table 1. Scope of the costs included

Cost item	Inclusion status
On-budget A360 costs from PSI Global, Society for Family Health (SFH) Nigeria, PSI Ethiopia, PSI Tanzania, University of California - Berkeley, Triggerise, and IDEO.org	Included
PSI HQ and partner overhead costs (on A360)	Included
PSI costs related to A360 but not directly billed to the project (nonbillable costs)	Included
PSI costs incurred in Tanzania pre-A360 directly related to subsequent A360 work	Included
CIFF management costs (incurred by CIFF)	Excluded
BMGF management costs (incurred by BMGF)	Excluded
Cost of A360 evaluation (the Evaluation Team)	Excluded
Costs to adopt and replicate A360 in other settings	Excluded
Opportunity cost of government personnel and volunteers	Excluded

2.6 Cost categorization

The study placed costs in six categories to allow appropriate analysis. The categories included:

1. *Location*, to assign spending to HQ or directly to one of three A360 countries (Ethiopia, Nigeria, and Tanzania)
2. *Phase*. Using transaction dates from the financial systems of PSI and its contractors, and country-specific information on the timing of design activities, the study tagged cost according to the following phases:
    a. Inception (not included in design costs)
    b. Inquiry
    c. Insight synthesis
    d. Prototyping (including pilot)
    e. Adaptive Implementation (not included in design costs)
3. *Input type*. Following the classification system of PSI and partner financial systems, we classified individual transactions by the following input categories:
    a. Personnel
    b. Other direct costs
    c. Travel
    d. Indirect costs
    e. Consultants and professional services
    f. Communication, information and education
    g. Program-related training, conferences and meetings
    h. Research, monitoring and evaluation
    i. Furniture and equipment

   j. *Commodities*
   k. *Promotions and advertising*
   l. *Sub-awards/sub-contracts*[5]

4. *Disciplines.* Using periodic surveys that asked staff to estimate proportion of time dedicated to the six A360 disciplines, costs were allocated by the six A360 disciplines (Figure 1). Recognizing that staff also worked on management and administrative activities not associated with a specific discipline, staff could also allocate their time to a seventh category of "general" activities.
5. *Funding source.* PSI financial records allowed tagging of line items according to who paid for it.
   a. *A360 global and country program costs*, including all costs chargeable to the A360 budget
   b. *Nonbillable costs,* including costs incurred by PSI but not chargeable to the A360 budget
   c. *PSI funding from a foundation other than BMGF and CIFF*, exclusively for early design work in Tanzania
6. *Main purpose.* Activities fell under four main purposes; this report focuses on costs allocated to the design of A360 interventions (b).
   a. *Create the A360 approach.* This includes most of the Inception phase (excluding some costs to promote for replication and adoption), and a portion of the subsequent phases to account for continued efforts to develop and refine the A360 approach.
   b. *Design the A360 interventions.* This includes designing and piloting solutions in the three countries.
   c. *Promote adoption and replication of the A360 solutions and adoption of the A360 approach in other settings.* This includes documentation for external audiences (e.g. developing the learning hub and producing content for it) and participation in key meetings and conferences.
   d. *Scale up and implement the A360 interventions.* This includes all activities that contributed to the operation of the interventions.[6]

2.7 Data collection and processing

Data collection used top-down costing drawing on the routine cost accounting systems of PSI and its partners, supplemented by surveys of A360 staff involved in design. Analysts collected and processed data from 2016-2020 and produced preliminary reports for the Inception and Inquiry phases, the Insight Synthesis phase, and the Prototyping phase. Data were processed in Excel.

2.8 Data from cost accounting systems

Analysts requested and received periodic reports from PSI and its partners that generated over one hundred thousand itemized transactions from routine accounting systems. Analysts combined the cost information into a single Excel worksheet, standardizing information on each transaction to allow appropriate categorization of costs (see section 2.6).

[5] For the main consortium partners, their individual transaction level data was received, and their costs were allocated to specific input types. Some smaller sub-contracts where this detailed data was not available were categorized here.
[6] We report these costs in separate intervention cost reports.

2.9 Staff surveys to allocate funding to countries

To help allocate costs that the accounting systems did not directly assign to a specific country, headquarters staff from PSI and its consortium partners completed periodic surveys (Table 2).

Table 2. A360 headquarters staff surveys

Period	Number of respondents
Calendar year 2016	24
January – September 2017	30
October 2017 – March 2018	16
April 2018 – March 2019*	13
April 2019 – April 2020*	17
May 2020 – September 2020*	9

**survey results not used for design costing but used for implementation cost calculations*

Surveys included questions about:

- How they split their time between implementation of A360 [including design activities and implementation of the interventions]; and activities to promote replication and adoption of A360 in other settings
- How staff split their time between countries
- How many trips they took and to where

Based on the survey responses, analysts assigned a proportion

- of time spent on each of the main purposes
- of time spent on each country

2.10 Allocating expenditures

PSI and partner expenditure reports provide the most accurate information on actual spending, but the existing accounting systems do not necessarily report in ways that make it easy to sort spending according to the various analysis categories. Therefore, this section describes the categories and the approach used to tag costs. In most cases, these categories can be cross tabulated (e.g. by country and input type).

2.10.1 Distinguishing between design costs and costs associated with replication and adoption

Beginning with the Prototyping phase, the costing distinguished between spending on activities related to design versus activities that promote or facilitate the adoption of the A360 approach or replication of the emerging solutions. Design includes travel to a country to help design one of the A360 interventions, and administrative and technical support for country activities. Activities that support or facilitate replication and adoption in other settings include creation of the A360 Learning Hub, presenting at conferences, and writing blogs for A360, and other efforts to communicate about A360 to various audiences. To distribute other costs between design versus replication and adoption activities, we surveyed headquarters staff from PSI and its consortium partners (see section 2.9).

2.10.2 Assigning spending to countries

Many transactions could not be directly allocated to a country and were initially categorized as headquarters' costs. The study allocated these headquarters' costs to countries using one of the following three procedures.

A. *Directly attribute expenditure items to one of the three countries*. All PSI expenditure items explicitly tagged to Ethiopia, Nigeria, and Tanzania were assigned to those three countries. Where we could easily identify the country associated with costs (for example, a flight to Ethiopia or a hotel in Nigeria), we assigned that cost to that country.[7] A similar process of direct allocation was done for IDEO.org based on details provided in their transaction level data. We also included some pre-A360 costs PSI Tanzania incurred in 2015 for HCD work that directly relates to the A360 project.

B. *Indirectly allocate unassigned personnel and travel costs*. The accounting systems for consortium partners other than PSI did not tag expenditures by country,[8] and for PSI, most global personnel costs and travel was tagged to "Headquarters" rather than a specific country (though some travel was manually reassigned as disrobed above). Thus, to allocate salary and travel costs not directly attributable to a country, we used a survey approach. We asked staff, of their time spent on design activities, what proportion was spent on supporting activities in each of the three countries. We averaged time spent on each country across staff members from each partner to get an overall distribution for each partner. We also asked all staff who travelled to provide the number of trips and their destinations,[9] and used this to allocate travel costs across countries.[10] From the surveys we generated estimates of % distribution of personnel travel by country. See Table 3 for an illustrative example; values used to allocate costs varied by partner and by phase.

C. *Indirectly allocate all remaining unassigned costs*. For consultants and professional services, furniture and equipment, sub-awards/subcontracts, research, monitoring and evaluation, other direct costs, and indirect costs, we allocated to countries based on each partner's split of staff time, calculated as described above. For commodities, promotions and advertising, communication, information, and education, and Program-related training, conferences, and meetings, we allocated based on each partner's split of staff time, excluding replication and adoption costs (see Table 3 for illustrative example).

Table 3. Illustrative example of survey-based allocation of joint global costs to countries, PSI, January – September 2017

	% allocated to				
Aggregated cost category	**Tanzania**	**Ethiopia**	**Nigeria**	**Replication and Adoption**	**Allocation procedure**
Personnel	19%	26%	23%	31%	B: Calculated directly based on staff surveys
Travel	23%	30%	37%	9%	B: Calculated directly based on # trip reports
Consultants and professional services	19%	26%	23%	31%	C: Relative to personnel
Furniture and equipment	19%	26%	23%	31%	C: Relative to personnel

[7] All SFH costs were assigned to Nigeria.

[8] For several of the cost items (again, items such as flights, hotels, etc.), we were able to manually assign those costs directly to a country.

[9] This is the number of trips recorded by survey respondents, the actual number of trips taken by A360 team members is higher, as some staff did not complete the survey (e.g. those no longer with PSI or on leave when the survey was implemented). Trips to a country for a non-country specific purpose (e.g. a global training) were excluded when calculating the distribution of travel by country.

[10] The analysis assumes that each trip generated the same cost. Note that in some cases, trips were already directly allocated to a specific country (see A above)—this process was only done for trips that could not be directly allocated to a country.

Aggregated cost category	% allocated to Tanzania	Ethiopia	Nigeria	Replication and Adoption	Allocation procedure
Sub-awards/sub-contracts	19%	26%	23%	31%	C: Relative to personnel
Promotions and advertising	28%	38%	34%	0%	C: Personnel excluding replication and adoption
Communication, information and education	28%	38%	34%	0%	C: Personnel excluding replication and adoption
Research, monitoring and evaluation	19%	26%	23%	31%	C: Relative to personnel
Program-related training, conferences and meetings	28%	38%	34%	0%	C: Personnel excluding replication and adoption
Other direct costs	19%	26%	23%	31%	C: Relative to personnel
Indirect costs	19%	26%	23%	31%	C: Relative to personnel

Source: Authors' unpublished calculations

2.11 Valuing inputs

The study valued inputs using financial cost (the amount somebody paid for an input). The study valued inputs in local currency or in US dollars as appropriate, and shows results in constant 2020 US dollars, using average exchange rates for the relevant periods.

2.12 Calculating incremental design costs

Data on DELTA costs were collected in 2017 from interviews with PSI and a review of DELTA design spending reports. DELTA typically began with formative research that fed into an in-country planning workshop. After the workshop, the design continued with solidifying activities and pretesting concepts. DELTA used both PSI international and local staff. Compared with the A360 approach, DELTA took less time overall, required fewer international trips, had much less in-depth pretesting and prototyping, and did not use designers from outside PSI.

Working with PSI intervention design experts, we estimated costs associated with a comparable design effort under the DELTA approach that best reflects the level of effort and complexity of what it would take to design an A360-style intervention. We estimated a total DELTA design cost of $338,546 per country.[11] To calculate a total incremental design cost, we subtracted the DELTA cost estimate from the A360 country-specific costs. From the total incremental design cost, we then calculated a total incremental design cost allocated to the study areas. We did that by dividing the total incremental design cost by the total number of geographies (woreda in Ethiopia, LGA in Nigeria, or district in Tanzania) in the country, then multiplying by the number of study geographies in each intervention. That generated a project lifetime incremental design cost. We then annualized that cost by assuming the design has a useful life of five years (see 2.13), producing an annual incremental design cost. Finally, we multiplied that annual cost by the duration of implementation of the study interventions to generate an incremental design cost for each intervention.

[11] It was expected that there would be some joint efforts between the design of the two interventions in Nigeria, therefore the cost of one DELTA design was assigned to the whole country rather than to each intervention, split evenly across the two interventions.

2.13 Amortization of design costs

The study considered design to be an intangible capital asset with a useful life of five years. For such assets, the common approach is amortization, spreading the cost of the asset over its useful life. Analysts typically use the straight-line approach to amortize intangible assets, simply dividing the total cost by the useful life for a yearly cost. The literature gives little guidance on useful life for health intervention design. The assumption of five years of useful life is a convention based on expert opinion to reflect that interventions, once designed, have an average lifespan of five years before they need to undergo redesign. Sensitivity analysis can test the impact of varying this five-year assumption.

2.14 Sensitivity analysis

Limitations in data collection, missing or incomplete data, assumptions required to differentiate design from implementations costs and from costs to create the A360 approach and to replicate/adopt the approach in other settings, all generated potentially significant uncertainty around the cost results. We used one-way and multi-way sensitivity analysis to help determine the extent to which changes in key assumptions and parameters might substantially alter the findings. Section 3.10 reports the results of these sensitivity analyses.

2.15 Ethical and other research considerations

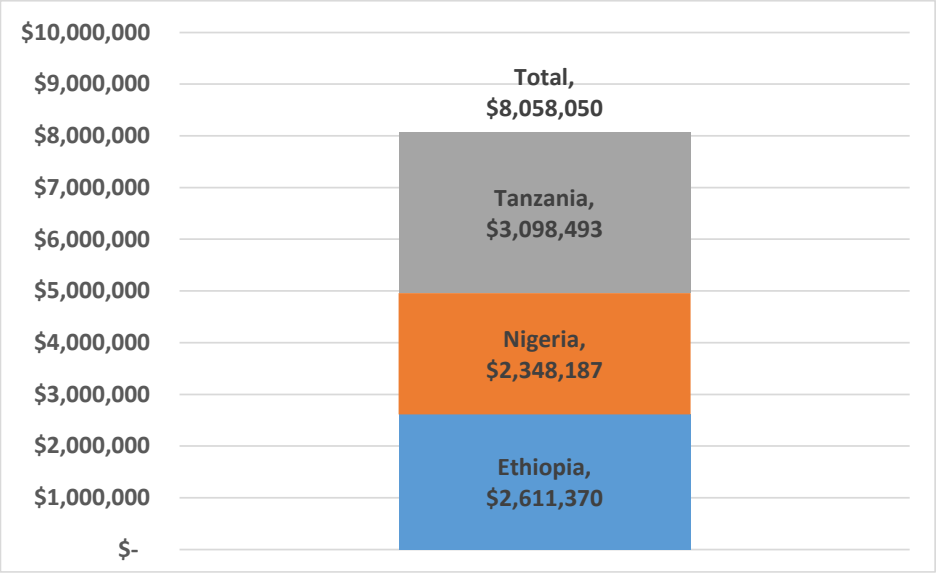
No clients or government officials were interviewed for the costing, thus IRB approval was not required or sought. Recognizing concerns about making sensitive cost information public, the evaluators signed a non-disclosure agreement (NDA) with the PSI consortium that permitted Itad and its subcontractors to view and analyse cost data needed to conduct the study analyses while protecting confidentiality. The NDA allows the publication of cost data at an appropriate level of aggregation. To protect the identity of individuals, reports do not name staff in this or any other public document. In addition, no results were publicly released until all institutions whose data has been used had a chance to review.

3 Results

3.1 A360 design cost

During inquiry, insight synthesis and prototyping, A360 spent approximately $8.1 million to design the interventions. A360 spent an additional $2.3 million to create the A360 approaches, and $0.8 million to promote replication and adoption of the A360 approach in other settings (these costs are not included in the results below). Of the total design cost, $2.6 million was spent on Ethiopia, $2.3 million on Nigeria, and $3.1 million on Tanzania (Figure 2).

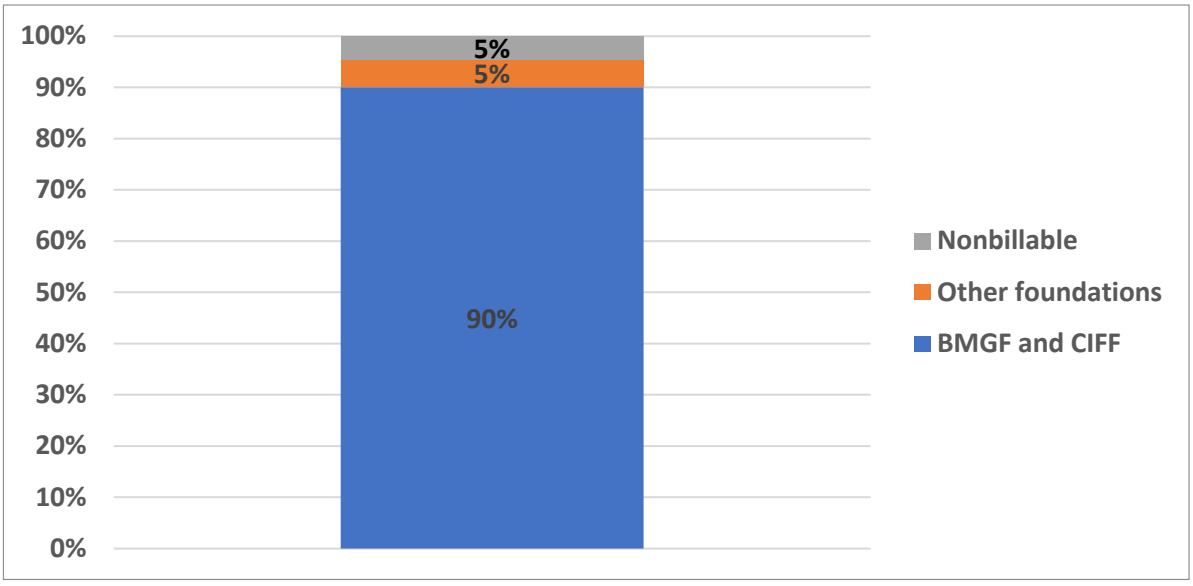
Figure 2. A360 design cost, total and by country



3.2 Design costs by funder

Of the $8.1 million design cost, BMGF and CIFF funded 90% of the total, with 5% of funding coming from another foundation and 5% from nonbillable costs borne by the consortium (Figure 3).

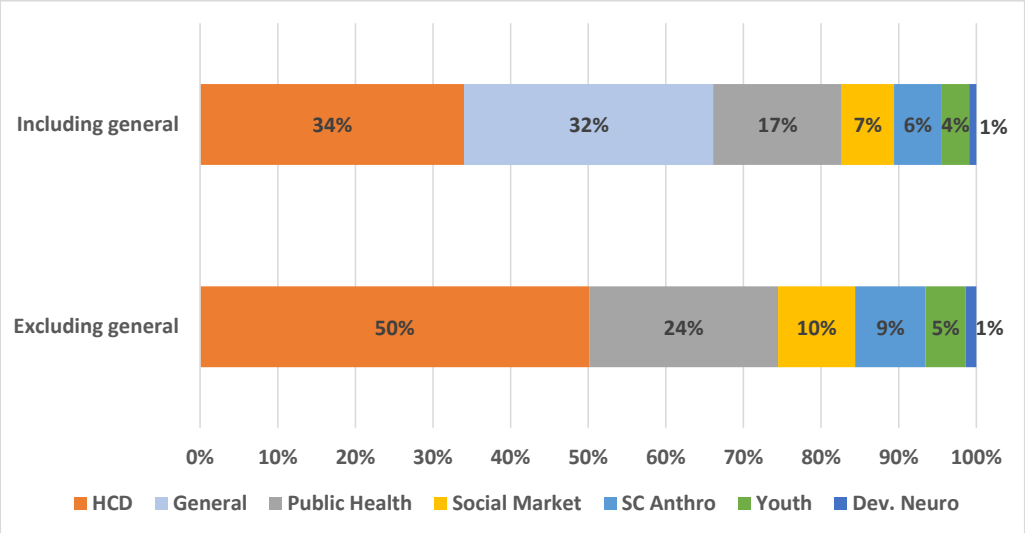
Figure 3. A360 design cost by funder



3.3 Design costs by discipline

Some general costs could not be assigned to a specific discipline. When including these general costs in the total, HCD accounted for about one-third of total spending (34%), followed by Public Health (17%), Social Marketing (7%), Sociocultural Anthropology (6%), Youth Engagement (4%), and Developmental Neuroscience (1%). When excluding general costs from the total, half (50%) was for HCD (Figure 4).

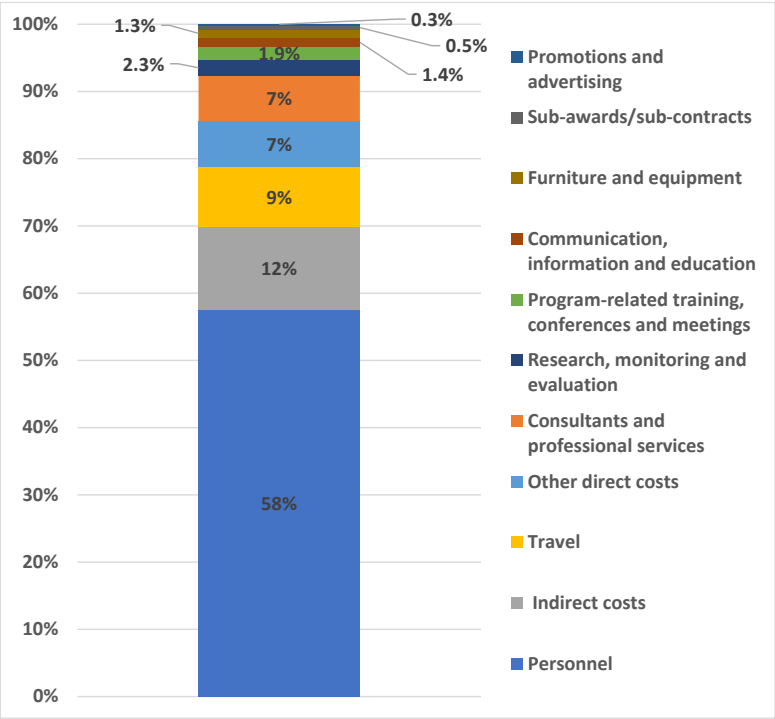
Figure 4. A360 design cost by discipline



3.4 Design costs by input type

Personnel accounted for most of design costs (58%), followed by indirect costs (12%). Each of the other inputs accounted for less than 10% of the total (Figure 5) design costs.

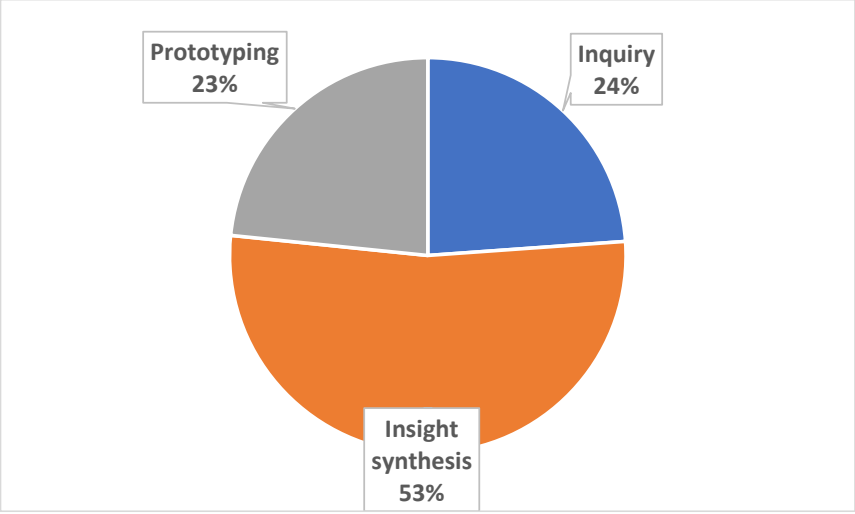
Figure 5. A360 design cost by input type



3.5 Design spending by phase

About half of spending (53%) took place during the Insight Synthesis phase, with the rest split between the Inquiry phase (24%) and Prototyping phase (23%) (Figure 6).

Figure 6. A360 design cost by phase



3.6 Country incremental design cost

Subtracting the DELTA design cost estimate of $338,546 per country (see section 2.12), produced a country incremental design cost of $2,272,824 for Ethiopia, $2,009,642 for Nigeria, and $2,759,947 for Tanzania (Table 4).

Table 4. Total incremental A360 design cost by country

	Ethiopia	Nigeria*	Tanzania
A360 Design Cost	$2,611,370	$2,348,187	$3,098,493
Less DELTA Cost	$338,546	$338,546	$338,546
Incremental Design Cost	**$2,272,824**	**$2,009,642**	**$2,759,947**

** Design costs in Nigeria were split one-third for the north and two-thirds for the south*

3.7 Total incremental design cost per geography

Dividing the country incremental design cost by the total number of intervention geographies (39 *woredas* in Ethiopia, 7 LGAs in Northern Nigeria, 19 LGAs in Southern Nigeria, and 100 districts in Tanzania) in the country, produced a total incremental design cost per geography of $58,278 for Ethiopia, $95,697 for Northern Nigeria, $70,514for Southern Nigeria,[12] and $27,599 for Tanzania.

[12] Analysts allocated one-third of Nigeria design costs to Northern Nigeria and two-thirds to Southern Nigeria. The MMA intervention in Northern Nigeria was designed as a replication of the 9ja Girls intervention in Southern Nigeria and the design process in the North drew most of the insights from the work in the South. Further, the level of support from the design lead team was limited in the north due to the security challenges in that region during the design period. Sensitivity analysis (section 3.10) tested this assumption.

3.8 Amortized annual incremental design cost per geography

Considering the design as an intangible capital asset with a useful life of 5 years, we calculated an annual incremental design cost per geography of $11,656 for Ethiopia, $19,139for Northern Nigeria and $14,103for Southern Nigeria, and $5,520 for Tanzania.

3.9 Incremental design cost applied to implementation period

We multiplied the amortized annual incremental design cost per geography times the number of years of intervention implementation for each study geography[13] to produce an incremental design cost by study geography. We then combined these by intervention to produce a total of $107,684 for the four study woredas in Ethiopia, $73,262 for the two LGAs in Northern Nigeria, $39,919 for the study LGA in Southern Nigeria, and $15,164 for the study district in Tanzania (Table 5).

Table 5. Design costs applied to implementation period in study geographies

	Total incremental design cost per geography	÷ Useful life (years)	= Amortized Annual incremental design cost per geography	X Implementation length (years)	= Incremental design cost applied to implementation period, by study geography	∑ Incremental design cost applied to implementation period, combined study geographies
Ethiopia						
Adea	$58,278	5	$11,656	2.2	$25,221	**$107,684**
Fentale	$58,278	5	$11,656	2.7	$32,020	
Lume	$58,278	5	$11,656	2.2	$25,221	
Wara Jarso	$58,278	5	$11,656	2.2	$25,221	
Northern Nigeria						
Doma	$95,697	5	$19,139	1.3	$25,466	**$73,262**
Karu	$95,697	5	$19,139	2.5	$47,795	
Southern Nigeria						
Ado-Odo Ota	$70,514	5	$14,103	2.8	$39,919	**$39,919**
Tanzania						
Ilemela	$27,599	5	$5,520	2.7	$15,164	**$15,164**

Combining this with information on costs of implementing the interventions,[14] design costs account for 10% of total costs in Ethiopia, 15% in Northern Nigeria, 7% in Southern Nigeria, and 11% in Tanzania.

[13] Estimates of years of implementation vary by study geography based on when scale-up began

[14] See individual reports on costing of the implementation of the four interventions.

3.10 Sensitivity analysis

Sensitivity analyses assessed how changes in key assumptions and parameters might alter the findings. We first conducted one-way sensitivity analyses, in which we independently measured the impact of changing individual parameters. We then combined the individual parameters to conduct multi-way sensitivity in which all parameters varied simultaneously.

3.10.1 One-way sensitivity analysis

Split between design and creation/adoption/replication cost. Assumptions about how costs were split between design activities and activities to create the A360 approach and adopt/replicate the approach in other settings were a major input into design cost estimates. These assumptions drew on information about the timing of costs (by phase), surveys of program staff, interviews, and information from the process evaluation. To reflect the uncertainty in these assumptions we recalculated design costs assuming an additional 20-40% of cost was spent on creation/adoption/replication as opposed to design. The 20-40% assumption varied by country and phase and was informed by staff survey responses. These changes decreased design costs by $31,357 in Ethiopia, $22,633 in Northern Nigeria, $12,332 in Southern Nigeria, and $4,898 in Tanzania.

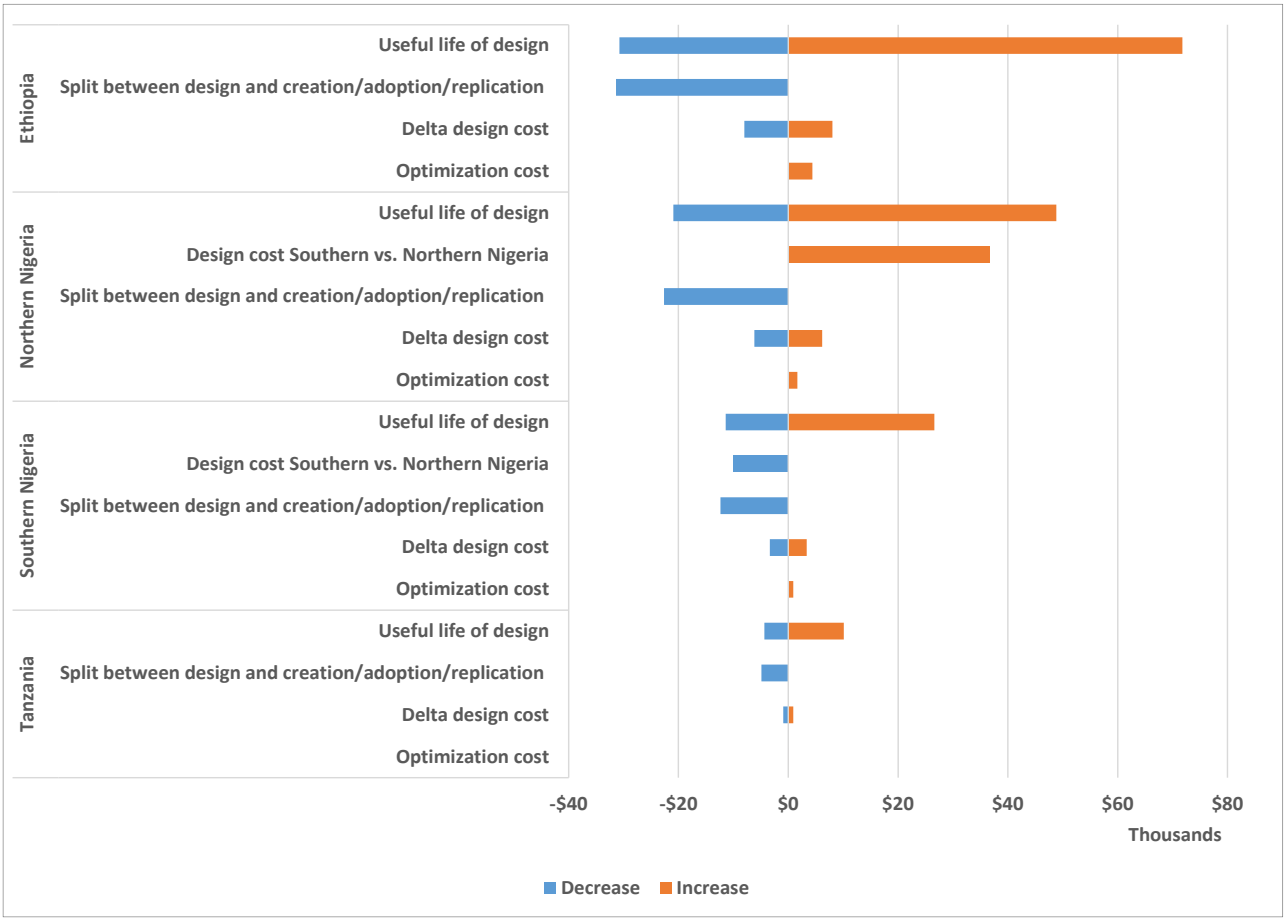
Optimization cost. For six months at the beginning of the Adaptive Implementation phase, the project entered an "optimization" period during which managers closely monitored project progress and adjusted the interventions. Our base case assigned no costs incurred during optimization to design activities. A sensitivity analysis assigned 50% of costs during optimization to design. This increased design costs by $4,404 in Ethiopia, $1,670 in Northern Nigeria, $910 in Southern Nigeria, and $99 in Tanzania.

DELTA design costs. We calculated design costs as the *additional* cost, over and above what it would have cost PSI to design the interventions under their standard DELTA design methodology. We estimated DELTA costs based on interviews with PSI staff and data from budget reviews. Recognizing the uncertainty in these estimates, we varied the DELTA design costs by 50% in either direction from the base value of $338,546. This generated a shift in either direction of design costs of $8,020 in Ethiopia, $6,171 in Northern Nigeria, $3,362 in Southern Nigeria, and $930 in Tanzania.

Useful life of the A360 design. Our base case assumption was that the useful life of the A360 design was 5 years, treating the design as an intangible capital asset. The sensitivity analysis recalculated design costs based on 7-year or 3-year useful life. In Ethiopia this decreased design costs by $30,767 or increased them by $71,789. In Northern Nigeria, the shift was -$20,932 to $48,841. In Southern Nigeria costs decreased by $11,405 and increased by $26,612. In Tanzania, the downward shift was $4,333 and upward shift was $10,110.

Split of design costs between Northern and Southern Nigeria. In our base case, we assumed allocated one-third of design costs to Northern Nigeria and two-thirds to the South. The sensitivity analysis assumed design costs were split equally between North and South. . This increased design costs in Northern Nigeria by $36,631 and decreased design costs in the South by $9,980.

Figure 7. Results of one-way sensitivity analysis around design costs



3.10.2 Multi-way sensitivity analysis

We combined the one-way sensitivity analyses for each intervention to produce plausible lower and upper bounds for total design costs. For Ethiopia, these were $47,791 to $192,840; for Northern Nigeria, $47,633 to $132,387; for Southern Nigeria, $ $12,977to $72,135; and for Tanzania, $$6,669to $$26,824.

4 Discussion

Few studies have focused on the costs to design an adolescent sexual and reproductive health intervention. Because the proponents of A360 hypothesized that the design process itself would be a major factor in the success of the interventions, analysts included design costs as an input to a cost-effectiveness analysis serving to expand the evidence base on adolescent sexual and reproductive health programs. The forthcoming cost-effectiveness analysis will gauge the total cost in the context of program outputs and impact.

The overarching findings of the design costing are:

- A360 spent approximately $8.1 million to design four interventions, split between $2.6 million for Smart Start in Ethiopia, $2.3 million for MMA in Northern Nigeria and 9ja Girls in Southern Nigeria, and $3.1 million for Kuwa Mjanja in Tanzania.
- BMGF and CIFF funded 90% of the total, with 5% of funding coming from another foundation and 5% from nonbillable costs borne by PSI.
- Of the six A360 disciplines, human-centered design accounted for half of design spending (excluding spending on general activities).
- Personnel accounted for most design costs (58%).
- Designing an adolescent sexual and reproductive health intervention using the A360 approach was much more expensive than designing using PSI's standard DELTA methodology, costing between three and nine times more, depending on the country. Based on budgets and program design, it was expected by the A360 consortium and funders that costs would be greater than the standard DELTA method. The total *incremental* design cost, after subtracting $338,546 per country to represent the cost of DELTA, was $2,272,824 for Ethiopia, $2,009,642 for Nigeria, and $2,759,947 for Tanzania.
- Calculating a cost per geography and amortizing design costs over the implementation period produced a total incremental design cost in the outcome evaluation geographies of $107,684 for Ethiopia, $73,262 for Northern Nigeria, $39,919 for Southern Nigeria, and $15,164 for Tanzania. Design costs in the study geographies are a function of the total cost for each country, the number of geographies where A360 was implemented, the number of geographies selected for the study and the duration of implementation in each study geography. Combining this with information on costs of implementing the interventions,[15] design costs account for 10% of total costs in Ethiopia, 15% in Northern Nigeria, 7% in Southern Nigeria, and 11% in Tanzania.
- Multiway sensitivity analysis produced plausible ranges of total incremental design cost in the outcome evaluation geographies of between $48,791 and $192,840 for Ethiopia; $47,633 to $32,387 for Northern Nigeria; $12,977 to $72,135 for Southern Nigeria; and $6,669 to $26,824 for Tanzania.
- Because of the paucity of data on design costs of adolescent sexual and reproductive health interventions, it is difficult to compare A360 to other programs aside from the DELTA comparison included within this study.

The following important limitations should be kept in mind when interpreting these results:

- Using retrospective surveys and interviews may have generated potential recall error in estimates of how A360 staff split their time between design and other activities. Reliance on interviews and limited

[15] See individual reports on costing of the implementation of the four interventions.

document review to identify costs of DELTA, the comparator design methodology, may have also produced error. We addressed these limitations through sensitivity analysis.

- Estimates of design costs are sensitive to the choice of useful life. More research is needed to expand the scarce literature on useful life of intervention design.
- Sensitivity analysis showed wide plausible ranges of design costs for the outcome evaluation geographies (the focus of the cost-effectiveness analysis). The cost-effectiveness analysis should take these ranges into account when doing its own sensitivity analysis.

Whether the substantially more expensive A360 design process was “worth it” in terms of added impact is a question the forthcoming cost-effectiveness analysis attempts to answer, drawing from evidence generated by the A360 Outcome Evaluation.

5 References

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Itad.com @ItadLtd mail@itad.com

Itad Ltd
Preece House
Davigdor Road Hove,
East Sussex UK
BN3 1RE

+44 (0) 1273 765250

Itad Inc
c/o Open Gov Hub
1100 13th St NW, Suite 800
Washington, DC, 20005
United States

+1 (301) 814 1492