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### Title

Berkeley ReadyMade Impact Assessment: Developing an Effective and Efficient Assessment Template for Social Enterprises

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**Berkeley ReadyMade Impact Assessment:  
Developing an Effective and Efficient Assessment Template for Social Enterprises**

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**Problem:** Social enterprises that want to grow need to raise money. In order to raise adequate funds and grow effectively, these organizations must assess their impact compared to their costs, demonstrate actual benefits to their target populations, and show that they are operating efficiently. However these full-scale assessments can be costly in both time and money and divert the social enterprise from delivering valued services or goods to their clients/customers; i.e., the opportunity costs of the assessments are high and may result in little value added to the organization. All organizations already collect data, often automatically through computerized systems or for internal auditing. Some fortunate organizations have had rigorous evaluations using controlled randomized trials. However organizations often end up not being able to generalize the findings of a rigorous analysis that is based on only a few locations to their other locations or to generalize the findings to their program over time. Other organizations collect data for assessment that sits unused or they undertake analyses that are not useful to them or their donors. Not knowing how to start, some organizations do not collect any data for impact analysis.

**Solution:** ReadyMade is based upon three premises:<sup>1</sup>

- A little information with analysis is better than a lot of data collection with little analysis.
- Using data already collected (or easy to collect), key variables can be found to proxy for outcomes and inputs in order to document impact in a simple statistical relationship.
- ReadyMade Impact Analysis is based on simple relationships of key variables and can complement more rigorous impact analysis that demonstrates causality. ReadyMade provides an effective and efficient way to scale impact analysis over projects and over time.

ReadyMade will provide effective and easy-to-use, on-line open source assessment tools that social enterprises can use to track the outcomes and impact of their projects by using data that is already being collected or can be easily collected. ReadyMade guides social enterprises through a process to identify key variables from existing data, and then guides them in conducting a simple yet useful assessment, including a written summary and graphical presentation of findings. ReadyMade also helps the organization link this analysis to other richer, more rigorous

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<sup>1</sup> These three premises grew out of Clair's work in developing and implementing UC Berkeley's undergraduate assessment program, which was implemented by faculty at the department level.

analyses in order to draw broader conclusions. ReadyMade will use open source technology, be publicly available, and be flexible to fit the needs of different types of social programs. The social enterprise can use the summary of findings and graphical presentations of the impact analysis to create reports for their donors and investors and for internal evaluation.

To develop the open source on-line tool, ReadyMade has undertaken pilot projects with selected social enterprises. Examples of two such pilots are below. These pilots will be used to further develop the on-line tool, which will then be tested by similar organizations.

An open forum on the ReadyMade web site will bring together the knowledge of practitioners and researchers. They can post questions and answers, provide external feedback on an organization's impact assessment, and cite studies that show how particular outcomes of the organization's work lead to broader social impact. For example, a nonprofit organization might demonstrate that their work leads to better health outcomes, thus leading to more school attendance, which leads to higher incomes in a specific country or region.

Down the road ReadyMade will develop an on-line template that can be used by organizations to embed a link of the ReadyMade data to a randomized evaluation (or other rigorous evaluation) so that the ReadyMade assessment can be compared to the rigorous evaluation and can be used to track outcomes after the more rigorous evaluation has been completed.

**The ReadyMade Team:** ReadyMade brings together a group of faculty and graduate students from the University of California, Berkeley (UCB) and other researchers, who have expertise in working with social enterprises that develop and deliver services and products to poor populations, in order to develop an effective and efficient on-line assessment tool. The ReadyMade team include Professors Clair Brown (Economics; Center for Work, Technology and Society; Chair), Sara Beckman (Haas Business School), Henry Brady (Goldman School of Public Policy), Eric Brewer (Computer Science; Technology and Infrastructure for Emerging Regions), John Danner (Lester Center for Entrepreneurship and Innovation), David Levine (Haas Business School; Blum Center for Developing Economies), Ted Miguel and Frederico Finan (Economics; Center of Evaluation for Global Action), Annalee Saxenian (School of Information), Larry Thal (Optometry),; postdoctoral researcher Eric Freeman, graduate students Ariel Chait and Fermin Reygadas; and Scott McNeil (De Novo Group).

**ReadyMade's Advantages:** A plethora of assessment methods and tools exist for a variety of organizations and purposes,<sup>2</sup> so why do we want to develop the ReadyMade on-line assessment

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<sup>2</sup> Reports that provide descriptions of various assessment methods include the Gates Foundation's *Measuring and/or Estimating Social Value Creation* (2008), <http://www.gatesfoundation.org/learning/Pages/december-2008-measuring-estimating-social-value-creation-report-summary.aspx>; RAND's *Valuing Benefits in Cost-Benefit Studies of Social Programs* (2008), [http://www.rand.org/pubs/technical\\_reports/TR643/](http://www.rand.org/pubs/technical_reports/TR643/); and Canada's *Making an Impact: A*

tool? Two main reasons: *cost* and *usefulness*. First we look briefly at the online tools available, and then discuss ReadyMade's advantages (and disadvantages).

Online tools, both free and fee-based and often with paid consulting services, have been developed for two major types of users:

1. *Impact investors*, who want to compare or benchmark companies for charitable investments and to track or monitor the financials of organizations in their portfolio. Examples include Impact Reporting and Investment Standards (IRIS), Monitoring & Evaluation Reporting & Integration Tool (MERIT), Pulse, Tools and Resources for Assessing Social Impact (TRASI).<sup>3</sup>
2. *Public agencies*, who need to evaluate broad social impact of proposed programs for possible funding and then to assess the impact of funded programs. Examples include United Nation's Human Development Index (HDI), Grameen Bank's Progress Out of Poverty Index (PPI), Multidimensional Poverty Assessment Tool (MPAT), Success Measures Data System (SMDS), and Acumen Fund BACO Ratio.<sup>4</sup>

ReadyMade offers the following advantages:

1. *Lower cost*: ReadyMade is less resource intensive than alternative on-line assessment tools, which require much more data without an easy way to analyze the data other than paying a consultant. ReadyMade costs significantly less than hiring a consulting firm to conduct a customized impact assessment, which also requires the organization spend time working with the consultant to collect data and making sure the consultant understands the program's goals and how it works.
2. *Usefulness*: ReadyMade uses the data usually collected by the organization to perform a statistical analysis, using interactive feedback from the user, and then uses the customized analysis to provide visualizations and summary of the impact results so that the organization can easily pull the ReadyMade outputs into various customized reports for their stakeholders. Alternative on-line tools do not provide a customized analysis and report without requiring consulting services.

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*Preferred Framework and Indicators to Measure Returns on Investment in Health Research*, Frank et al (2007), <http://www.caahs-acss.ca/e/publications/>. Also see the MIT Poverty Action Lab <http://www.povertyactionlab.org/methodology/what-evaluation> and UC Berkeley's CEQA <http://cega.berkeley.edu/> for reports on randomized evaluations. See Clair Brown, "A Critical Overview of Online Assessment Tools and Materials", Center for Work, Technology and Society, UC Berkeley, 2011.

<sup>3</sup> See <http://iris-standards.org/>, <http://sites.google.com/a/npoki.org/merit/>, <http://www.acumenfund.org/investments/investment-performance/pulse.html>, <http://trasi.foundationcenter.org/>

<sup>4</sup> See <http://hdr.undp.org/en/statistics/hdi/>, <http://www.grameenfoundation.org/what-we-do/microfinance/measuring-progress>, <http://www.ifad.org/mpat/>, <http://www.nw.org/network/ps/successmeasures/smds.asp>, [http://www.acumenfund.org/uploads/assets/documents/BACO%20Concept%20Paper%20final\\_B1cNOVEM.pdf](http://www.acumenfund.org/uploads/assets/documents/BACO%20Concept%20Paper%20final_B1cNOVEM.pdf)

ReadyMade does not provide two things. First, ReadyMade does not use standard data or conduct impact assessments that can be compared across programs, unless the organizations intentionally set up their ReadyMade analyses to do this. Second, ReadyMade does not demonstrate causality or quantify the broader social impacts of a program. However the ReadyMade analysis complements these more rigorous (and costly) methods.

**Pilot Projects: Developing the ReadyMade Approach through Pilot Assessments and an On-line Prototype**

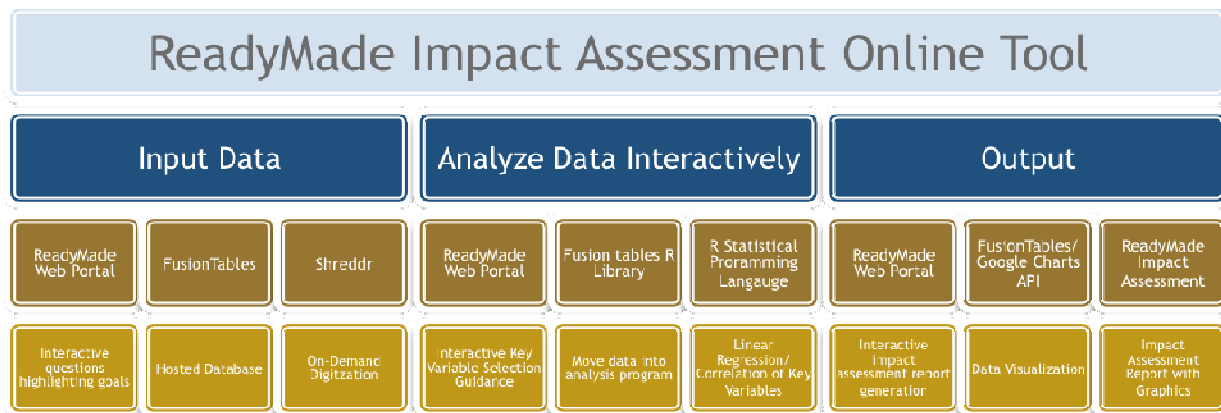
The first step in developing the on-line ReadyMade assessment tool is to conduct pilots of the ReadyMade approach with a selected group of social enterprises in order to understand how to appropriately design the ReadyMade templates for real-world situations. Two ReadyMade pilots, one in health care (cataract surgery) and one in improved livelihood (financing worker cooperatives), are presented below as examples of ReadyMade impact assessments. These assessments were done by the social enterprises with guidance and input from the ReadyMade team.

The second step is to develop an on-line prototype tool that can be tested by similar organizations with less direct involvement from ReadyMade developers.

The third step is to provide a beta version of ReadyMade on-line assessment to selected organizations, which will serve as testers.

**ReadyMade Templates and Open Source Technology**

The ReadyMade on-line tool is comprised of three modules: Data Selection/Input, Data Analysis, and Output. The following is a description of the various open source technologies that may be used in the design of each module.



To begin a ReadyMade analysis, an organization must first upload its data to the service. The ReadyMade web tool will allow users to upload excel, csv, or stata files containing their data. To

store and host this information online, ReadyMade will utilize Google's Fusion Tables<sup>5</sup>, a free service for hosting and managing large collections of data in the cloud.

Many organizations may not have their data in digitized format, a common barrier to information-based decision making and reporting in the developing world. If an organization's data has been collected on paper but not yet digitized, ReadyMade will provide instructions on how to use open source Shreddr<sup>6</sup>, an on-demand paper based data digitization technology. With Shreddr, users scan or take a picture of paper-based forms, from which they receive digital data, accurately transcribed via crowd-sourcing, which can then be used by ReadyMade.

Once data has been successfully stored in a Fusion Table, ReadyMade presents the organization with a series of interactive questions to help identify which variable(s) best describe impact, and which associated activities or inputs it would be useful to control in order to understand that impact. The guiding algorithm will help lead organizations towards the identification of these key variables that best describe the organization's impact and characteristics, and on which ReadyMade will base its statistical analysis.

To conduct the statistical analysis ReadyMade may use one of two programming languages. 'R' is a powerful open source programming language used for statistical software development and data analysis<sup>7</sup>. ReadyMade could build an 'R' program to interface with FusionTables in order to import the relevant data, conduct correlation and linear regressions, then export results back to a Fusion Table for storage. Python<sup>8</sup> is a popular open source programming language that can also interact with FusionTables. Python supports open source statistics modules, such as SciPy<sup>9</sup>, which are able to conduct statistical analysis as well. 'R' may be more powerful than Python when it comes to statistics, but Python may interface better with Fusion Tables. Once the statistical analysis is complete, ReadyMade stores the results back in a Fusion Table.

The third step is to produce an impact assessment report. That is, once the desired components of an analysis are selected, a ReadyMade impact assessment report will be generated, which provides a short summary of findings with graphics. The user can extend and supplement the report to suit various audiences.

ReadyMade will develop an open source template for selecting and explaining the statistical results, including visualizations. To create visualizations of the results, one of many open source technologies may be used. Google Chart Tools<sup>10</sup> provides simple interactive charts and data visualizations. Chart Tools provides a simple interface for creating data visualization such as pie, scatter, line, and column charts among others. The resulting visualizations are simpler than other more robust tools, but the ease of programming such charts makes Google Chart Tools a viable

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<sup>5</sup> <http://www.google.com/fusiontables/public/tour/index.html>

<sup>6</sup> <http://www.shreddr.org/>

<sup>7</sup> <http://www.r-project.org/>

<sup>8</sup> <http://www.python.org/>

<sup>9</sup> <http://www.scipy.org/>

<sup>10</sup> <http://code.google.com/apis/chart/>

option for the visualization of ReadyMade results. Some examples of Google Chart visualizations can be found at

<http://code.google.com/apis/chart/interactive/docs/gallery.html>

There are other tools that can be used for visualization. gRaphael<sup>11</sup> is a JavaScript library that also creates interactive charts from data. ProtoVis<sup>12</sup> is an open source data visualization library that can be used to produce more intricate visualizations if necessary. Both gRaphael and ProtoVis provide robust frameworks for visualizing data, but also require heavier programming. These tools are useful for presenting complex or large amounts data in elegant and understandable visualizations. gRaphael and ProtoVis are possible visualization solutions for ReadyMade data, examples can be found at:

<http://g.raphaeljs.com/>

<http://vis.stanford.edu/protovis/ex/>

IBM's Many Eyes<sup>13</sup> and WonderGraphs<sup>14</sup> are similar proprietary source tools that can also be used to produce ReadyMade data visualizations. These tools do not fully comply with ReadyMade's drive for a fully open source solution, but may provide interesting functionality that is not available through other tools, like Fusion Table integration and a graphical user interface.

Data visualization will be a key component of a ReadyMade report. These visualizations will be generated by one or more of these open source tools depending on their ability to meet the needs of ReadyMade users.

The combination of Fusion Tables and Shreddr for data entry and storage, Python or R for statistical analysis and Google Chart Tools, gRaphael, or ProtoVis for data visualization, will make ReadyMade a powerful easy-to-use, open source technology tool for impact assessment.

The three interactive ReadyMade modules, the open source tools used, and the output provided the user are shown in Figure 1.

We now give examples of ReadyMade Analyses, starting with the first of the two pilot projects, Hospital de la Familia cataract surgeries.

## **ReadyMade Pilot Project: Hospital de la Familia Cataract Surgery**

### **Introduction and Questions**

Hospital de la Familia (HDLF) provides medical care to some rural residents of Guatemala, who otherwise receive little or no medical care. Medical teams from the U.S. go to Nuevo Progreso,

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<sup>11</sup> <http://g.raphaeljs.com/>

<sup>12</sup> <http://vis.stanford.edu/protovis/>

<sup>13</sup> <http://www-958.ibm.com/>

<sup>14</sup> <http://www.wondergraphs.com/>

Guatemala to provide a broad range of medical care three or four times each year for eight to ten days each trip. Here we focus on assessment of cataract surgeries performed in August 2010.<sup>15</sup> The ReadyMade analysis began by having HDLF state the key question for impact assessment:

**Impact Question:** To what extent do a patient and her/his family benefit from cataract surgery, in terms of the patient's ability to function independently, to contribute to family care and to household resources, as well as the ability to engage in community activities such as church?

Improvements in the patient's participation in daily activities are the outcomes by which we measure the success of the surgeries. We collect data on the patient's capability to participate ("usually", "sometimes", or "never") in four activities before and after cataract surgery:

- assisting with household tasks,
- caring for oneself,
- assisting with the care of others, and
- working for pay.

A key feature concerning cataract surgery is that results of the surgery can vary widely, as measured by the extent to which vision is improved. It is also important to understand that the ultimate improvement in visual acuity (i.e., the technical way that vision quality is measured) cannot be determined immediately after the surgery because it improves over time and the progress is hard to predict.

The collection of patient data on the ability to perform many daily activities is time-consuming and expensive to implement, particularly because it often involves the use of translators to accommodate local dialects and illiteracy. It therefore would be useful if the success of the cataract surgeries could be measured by looking at an outcome variable that is easy for the staff to collect. The medical staff suggested that the patient's ability to walk unassisted was a key outcome of cataract surgery for many patients, and might serve as a proxy for patient capability to perform daily activities. Moreover the quality of whether or not a patient can walk unassisted is something that can be noted by hospital staff whenever a patient comes in to the hospital, whether for the surgery or for a follow-up appointment and thus could provide an inexpensive way to collect data on an ongoing basis. Thus we have a secondary question for the analysis, as follows:

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<sup>15</sup> Dr. Larry Thal (Assistant Dean and Clinical Professor of the Optometry School at UC Berkeley and a member of the HDLF Hospital Board of Directors), who has participated for 25 years on medical missions to Guatemala, worked with Dr. Clair Brown (Professor of Economics and Director of the Center for Work, Technology, and Society, UC Berkeley) to design a survey and collect data on cataract patients. Dr. Thal and the HDLF team collected the data in August 2010.



**Key Proxy Variable Question:** Can a particular outcome variable, namely the ability to walk unassisted, serve as an acceptable proxy variable for the daily activity outcome variables?

Here we describe how HDLF collected data from patients, including simple survey data plus in-depth interviews, and then conducted a ReadyMade analysis of the quality improvements in patients' lives in order to compare outcomes with costs. In the analysis below, we do the following: (i) we present a basic impact assessment of patient outcomes; (ii) we assess if the ability to walk unassisted can serve as a proxy variable for patient outcome; (iii) we use more detailed interview data to estimate the impact of the surgeries on patients' time use; and finally (iv) we use this last estimate to produce a very simple cost/benefit analysis.

### Collecting Patient Data

HDLF collected patient data in three ways.<sup>16</sup> Data were collected directly from patients who visited the Eye Clinic in August 2010 and who had undergone cataract surgery on a prior visit. Information on a patient's mobility, i.e. ability to walk unassisted, and perform daily tasks before (recall data)<sup>17</sup> and after cataract surgery as well as demographic data were collected from surveys of the 59 patients who visited the Eye Clinic on three of the eight consecutive days that the clinic was open.<sup>18</sup> Extensive interviews were conducted of a random subsample of 13 of these patients, thus providing additional detailed information on time use patterns for these patients.<sup>19</sup> Data on mobility after cataract surgery and demographic data were also collected from patient files of the 39 patients who visited the Eye Clinic on two of the other days that the clinic was open.<sup>20</sup> For these patients, using a rule devised by the clinic staff and Dr. Larry Thal, data on visual acuity were used to impute mobility both pre-surgery and at current visit to clinic (post-surgery), allowing us to look at a larger sample, albeit with imputed data.<sup>21</sup>

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<sup>16</sup> We assume that patients who return to the clinic are representative of the universe of patients. However if patients don't return because of physical health makes it difficult, this could give an upward bias to the estimates of benefits. More likely, if patients don't return because their vision is greatly improved and requires no additional care, this could give a downward bias to the estimates.

<sup>17</sup> The interviews were conducted when these patients returned to the clinic after surgery, and thus any information the patients report about their pre-surgery condition is by definition from memory.

<sup>18</sup> The three days were days 5,6 and 7 (out of days 1-8).

<sup>19</sup> These interviews were conducted by Juan Artiaga, to whom we are very grateful.

<sup>20</sup> The two days were days 3 and 4.

<sup>21</sup> The rule mentioned is as follows. Based upon the observations of eye clinic staff members, Dr. Thal used the following guidelines to map visual acuity to capability to walk unassisted:

- acuity of 20/400 or better: nearly always walked by themselves
- acuity of 20/800 or worse: almost never walked unassisted
- acuity of between 20/400 and 20/800: "sometimes" walked unassisted.

We note that an important use of this rule is in testing the validity of the recall data used for the 59 interviewed patients and as a check on using mobility as a proxy for improved acuity. Visual acuity cannot be measured right after surgery because vision improves in the days following surgery, after the patients leave the clinic to return home.

We found that the 39 patients from the file survey were older (8% under 60 years and 51% over 80 years) than the 59 patients from the self-reported survey (24% under 60 years and 24% over 80 years). So, although patients seemed to report greater mobility and self-reliance before cataract surgery than was recorded from patient files, this reflected their age. HDLF medical staff is interested in the relationship between visual acuity and mobility and intend to collect more data to analyze the relationship in the future.

### Impact Assessment

First we look at the key impact question of how cataract surgery affects patient outcomes.

We observe that the ability to walk unassisted is indeed a measure that increases after surgery. The total sample (98 patients) is almost evenly divided in the ability to walk unassisted before cataract surgery (30% usually walk unassisted and 32% never walk unassisted), and their mobility improves dramatically after cataract surgery (75% usually walk unassisted; those who do not typically report other health problems that cause mobility problems).<sup>22</sup>

Next we look at the four daily activities to see if patients’ capabilities improved after cataract surgery. Overall we see that the majority of the 59 patients who answered the survey were able before surgery to walk unassisted and to participate in household tasks, caring for others, and caring for self (see table below). So we are not surprised that these patients tended to report that their participation in these activities stayed the same after surgery. More importantly, those patients who were *not able* to participate in these three activities before surgery were usually *able* to participate after surgery. We observe a different pattern in the activity “paid job”: only 18 patients (31%) reported working for pay before surgery, and 14 of them were men (56% of the men); the percentage increasing and decreasing were the same low 12%. Now we turn to a statistical analysis of the relationship between patients’ ability to walk unassisted and their daily activities.

### Post-surgery Changes in Patient Activities

Activity (number of cases)	Presurgery		Postsurgery	
	Usually	Increased	Stayed Same	Decreased
Walk Unassisted (58)	51%	40%	48%	12%
Household Tasks (57)	68%	39%	49%	12%
Assists others (59)	54%	25%	63%	12%
Care of self (59)	76%	19%	76%	5%
Paid Job (59)	31%	12%	76%	12%

<sup>22</sup> The results for the patients whose data were collected from their files reflect the rule used in relating mobility to vision acuity, and we note that the overall results are not driven by only these patients, as the analysis below of the 59 other patients shows.

### **Investigating a Potential Proxy Variable for Impact**

To explore the question of whether mobility can serve as a proxy variable for the key outcomes, we use simple correlations, and also basic linear regressions, in order to control for age and gender. Here we summarize the important relationships.

The ability to walk unassisted before and after surgery, and the difference between the two, are correlated with the four daily activities, which implies that mobility is a good indicator of patient's capability in daily activities. This gives one indication that the ability to walk unassisted can serve as a proxy for the other outcome variables.

Then we use linear regressions to analyze the relationships between the improvement in daily activities and the improvement in a patient's mobility; i.e., we regress the improvement in a specific daily activity on the patient's improvement in walking unassisted, with controls for age and gender.<sup>23</sup> We take these simple statistical relationships as indicators of how closely improvement in mobility mirrors patients' improvement in daily functioning before and after cataract surgery. For three of the four daily activity variables (assisting with household tasks, caring for oneself, and assisting with the care of others), improvement after surgery is significantly and positively associated with the improvement in mobility, when controlling for age and sex.

The regression on improvement in working for pay is not statistically significant. The patient's improved capability to hold a job and earn income does not seem to be an important outcome for these cataract patients, because typically women do not work for pay and because of the elderly age of the patients, which is negatively related to having a job either before or after surgery. However in a regression on the subsample of the fourteen patients who are under 60 years old, improvement in working for pay was positive and significantly (5% level) related to improvement in mobility, controlling for sex (not significant).<sup>24</sup> Overall we think that working for pay, and the improvement in family income that earnings bring, is not a good indicator of the

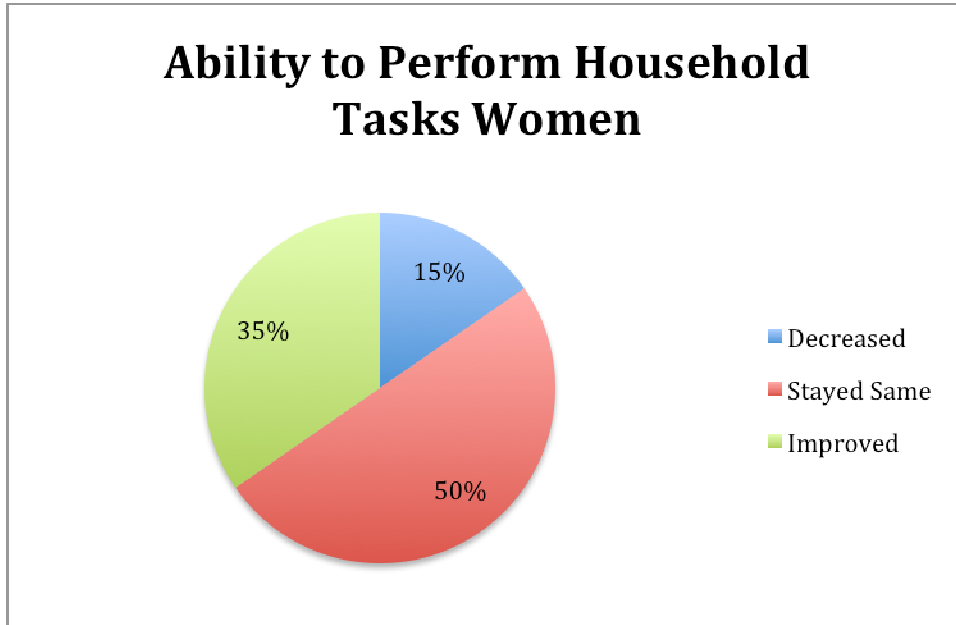
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<sup>23</sup> We defined each of the variables which measure improvement in capability in activity in the following manner. If the post-surgery value was greater than the pre-surgery value, the associated improvement variable was given a value of 1 for "Increased", and -1 for "Decreased" if the inequality was reversed. If the post- and pre- values were the same, the improvement variable was given a value of 0 for "Stayed the Same".

<sup>24</sup> The same regression on the subsample of patients under 70 years old had similar results. However the same regressions for those age 60 to 70 years old and for those 70 and older did not show any relationship between improvements in working for pay and improvements in mobility, given sex.

increase in quality of life for HDLF’s cataract patients because many of them are women or are older men, who are past prime working age.

Here we show the results of the statistical analysis for the improvement in one activity, Assisting with Household Tasks, as an example of the statistical tests conducted. The pie chart shows that the ability to perform household tasks after cataract surgery improved for 35% of the female patients, and remained the same for one-half of the patients.



The results for the linear regression on improvement in assisting with household tasks show that the improvement is significantly and positively related to Walk Improvement, given controls for age and sex.<sup>25</sup> The controls for sex and age are not significant in any of the regressions for the

**Regression: Improvement in Assisting with Household Tasks**

Task Improvement	Coef.	Std. Err.
Walk Improvement	0.482***	0.122
Age	-0.002	0.006
Sex	-0.163	0.163
Constant	1.36***	0.466
# Observations	56	
Prob > F	0.002	

<sup>25</sup> These regressions have a maximum of 58 observations because data on the capability variables were collected only from the patients and were not available from the files.

Adj R <sup>2</sup>	0.202
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\*\*\*Significant at 1% level

\*\*Significant at 5% level

\*Significant at 10% level

three daily activities, which indicate that the results do not vary significantly by age and gender. These results indicate that improvement in mobility is a good proxy for the patient's improved capability in assisting with household tasks, providing care for self, and assisting with care of others.

We note that patients' likelihood of improved mobility after surgery increased with their age: the majority of patients over 60 had improved mobility after surgery, while the majority of patients under 60 years old reported that their mobility stayed the same (i.e., they already walked unassisted).<sup>26</sup> These data indicate that improved mobility is a good indicator of the impact of cataract surgery on older patients' lives, but is not as good an indicator for patients under 60 years old. HDLF will consider what proxy, if any, would be better for patients under 60 years old.

Using improvement in mobility provides a conservative indicator of the improvement in the patient's functioning and quality of life as a result of cataract surgery, because even when mobility stays the same, primarily for patients who could walk unassisted before cataract surgery, their better vision appears to improve their capabilities and their daily lives independent of their mobility: we heard examples of this in our interview surveys.

Overall, HDLF is very pleased with the results from this pilot survey and assessment. HDLF thinks that the survey results provide two important outcomes:

1. Cataract surgery improves the patients' quality of life by increasing the capability of patients in their caring for themselves and others, and in assisting in household tasks. For these older patients, the capability to work for pay is not affected by cataract surgery.
2. Mobility and its improvement is a good proxy for patients' capabilities pre- and post-surgery (for those over 60 years old), and this variable is easy to collect to provide an impact assessment on an ongoing basis.

### **Effect on Patients' Time Use**

We now use our detailed interviews of post-surgery patients to estimate improvements in time use in daily activities resulting from cataract surgery. Our interviews indicated how women and

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<sup>26</sup> Of our 97 patients, 55% are female and 45% male; 34% are over 80 years and 17% are under 60 years old, with 25% in their 60s and 22% in their 70s.

men tend to use their time if they are able or not able to walk unassisted.<sup>27</sup> These estimates of the hours of daily activities associated with the ability to walk unassisted allow us to estimate indirectly the improvements in time use from cataract surgery. It is important to note that there are only 13 interviews, so our estimates provide only a first approximation, which could be improved with more data.

A summary of some information from the interviews is presented in the table below. We see that post-surgery female patients who are mobile are actively involved with housework tasks (including care for others) and with interactions with family and at church, and also some self-care; post-surgery male patients who are mobile are actively involved with their jobs (both for pay and at home), and spend some time taking care of themselves, on housework tasks, and in interactions with family and at church.

Our structured interviews verified that the daily activities for patients who cannot walk unassisted are highly constrained; these patients have a difficult time doing more than minimal self-care. They generally need to be fed and cared for. Men cannot work for pay, and women cannot do much to assist in tasks or care for others at home. Although women go to church and spend time with family members, they need assistance with these activities. Women are able to participate in church activities once they have made it to church, and church was reported as being very important by the women.

Overall we see that the gain in daily quality hours from becoming mobile with improved vision is 13 for women and 15 for men. Men gain more quality activity hours because men tend to engage in more activities that require good vision compared to women: before surgery, women spend more hours with their families or at church than men spend, and these social activities are easier for women with poor vision to do.

#### Daily Activities for Women and Men (by mobility)

	Able To Walk Unassisted		Cannot Walk Unassisted		Quality Hours Gained	
	Women	Men	Women	Men	Women	Men
Housework Tasks (includes care for others)	10 hrs	2 hrs	0 hrs	0 hrs	10 hrs	2 hrs
Job	0 hrs	10 hrs	0 hrs	0 hrs	0 hrs	10 hrs
Care of Self	1 hr	3 hrs	1 hr	1 hrs	0 hrs	2 hrs
Family & Church	5 hrs	1 hr	2 hrs	0 hrs	3 hrs	1 hr
Total Quality Hours	16 hrs	16 hrs	3 hrs	1 hr	13 hrs	15 hrs
Sleep	8 hrs	8 hrs	8 hrs	8 hrs		

<sup>27</sup> Although some differences are observed by age, these differences mainly reflect the patient's health, which is reflected in the mobility variable. This confirms the statistical relationships found above.

Inactive	0 hrs	0 hrs	13 hrs	15 hrs		
Total hours in day	24 hrs	24 hrs	24 hrs	24 hrs		

We assume that each person has 16 hours of possible quality hours per day, and the gain in daily quality hours as a fraction of the total possible is 0.81 for women and 0.94 for men (an average of 0.9 for our sample)<sup>28</sup> for the patients who cannot walk unassisted before surgery and can walk unassisted after surgery. Our calculation of the gain in daily quality hours is a simple version of quality adjusted life years (QALY), which is used in cost-effectiveness analyses as a measure of improvement in quality-adjusted life expectancy of a specific health intervention relative to no intervention over the relevant period of improvement in quality of life.<sup>29</sup>

In order to apply the improvement to all patients who receive cataract surgery, the patients are divided into three categories of improvement (0, 1, 2) that reflect their mobility before and after surgery; category 2 indicates maximum benefit (patient goes from immobile to mobile), category 1 indicates some improved or unchanged mobility, and category 0 indicates negative change (decline in mobility). Decreases in ability to walk unassisted after surgery (category 0) are ignored in the few cases where this occurs, because in interviews we learned that patients' inability to walk unassisted was related to another health problem, such as a leg injury.

**Three Categories of Improvement  
(given patient's before and after ability to walk unassisted)**

PreWalk/PostWalk	Yes	Sometimes	No
Yes	1	0	0
Sometimes	2	1	0
No	2	1	1

For each year post-cataract surgery, we assign an improved quality adjusted life year proportion (i.e., the proportion of quality hours that the patient gains (if positive) or loses (if negative)) of 0.9 to Category 2. This assumes that a cataract patient who was not able to walk unassisted pre-surgery and is able to walk unassisted post-surgery gains back 90% of her/his quality hours in each day (and year).

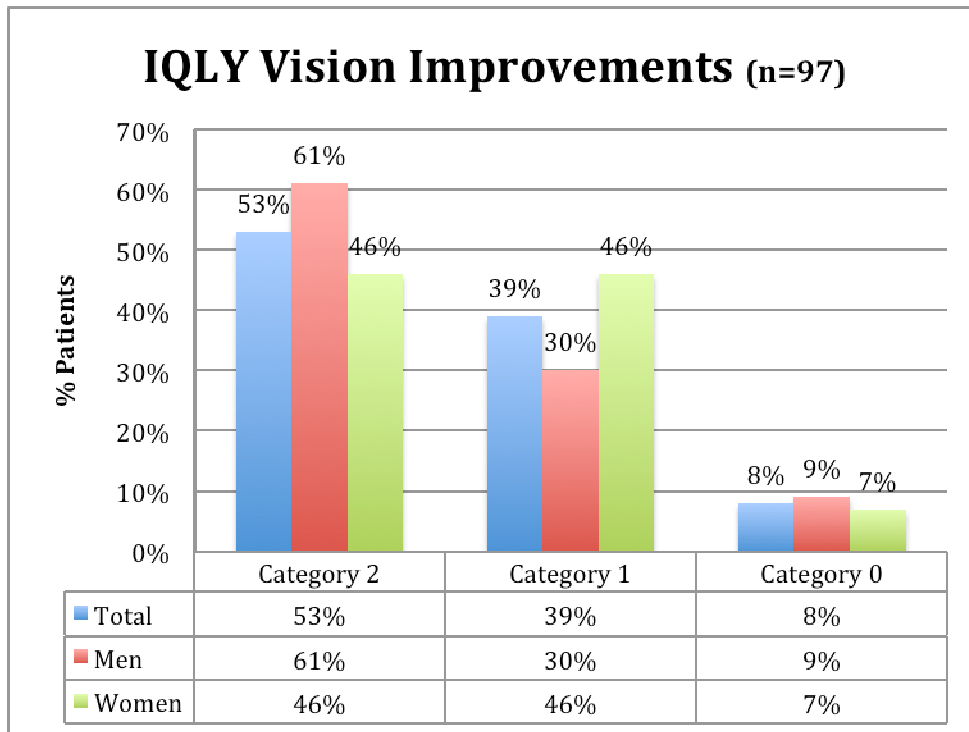
We do not have data for assigning improved quality adjusted life year proportion for patients who have improved vision after cataract surgery but whose mobility remains the same (Category

<sup>28</sup> This is a weighted average, using the total sample of 97 patients, with 44 percent male and 56 percent female, and rounded to one decimal place. This assumes that our sample represents the gender distribution of all cataract patients at HDLF.

<sup>29</sup> For an overview of QALY, see Franco Sassi, "Calculating QALYs, comparing QALY and DALY calculations", Health Policy and Planning, 21: 402-408.

<http://heapol.oxfordjournals.org/content/21/5/402.short?rss=1&ssource=mfc>

1), and so we arbitrarily assign them a range of possible improved quality life year proportion of 0.3 to 0.7 (midpoint 0.5), which allows us to see how sensitive the results are to the assumed improvement in quality adjusted life year proportion.



Given the distribution of our sample’s mobility category and our estimated improved quality life year proportion for categories 1 and 2, we calculate the following estimate:

**Increase in Improved Quality Adjusted Life Year Proportion for average patient: 0.67**

What does this estimate .67 mean? It indicates that the average patient in our sample had proportional improvement in quality hours per day (or per year) of .67: her or his quality hours after cataract surgery improved by almost two thirds of the (waking) day. The average HDLF cataract patient has almost 11 more quality hours to enjoy each day.

Our estimated improved quality adjusted life year has a range of 0.59 to 0.75, depending upon the assumed improved quality life year for Category 1. This range indicates that the average improved quality life year proportion is not overly sensitive to our assumption about the gain in daily quality hours for patients in Category 1: when the gain goes from 0.3 to 0.7 (when it more than doubles), the average proportion improvement only increases by a quarter. Even if we assume a low score of improved quality adjusted life proportion for the patients whose mobility remained the same (or improved only slightly), the average patient’s improvement in quality hours per day was almost 60%, or over 9 more quality hours to enjoy each day.



We can then apply this improved quality life year proportion to the life expectancy of the cataract patients to estimate the average patient's improvement in quality adjusted life years. In 2010 the average age of the HDLF cataract patients in our sample was 72 (median 71), which is a conservative estimate because they received the cataract surgery in a previous visit, and thus were actually younger when they had the surgery. We compare this to the life expectancy for people who have reached age 72 in Guatemala,<sup>30</sup> which is 86 years old for our sample.

**The average cataract patient can expect to live for an additional 14 years with an improvement in quality life years of .67, or 9.4 additional years of quality life (QALY).**

### **Cost/Benefit Analysis**

Next we look at HDLF's costs to run the Eye Clinics<sup>31</sup> in order to compare the average QALY benefit to its corresponding cost. We take one half of the total out-of-pocket costs for all clinics incurred by the U.S. medical teams for 2009 (\$154,496), and add \$3200 for the annual depreciation cost of the clinic building.<sup>32</sup> Thus the total estimated cost for the HDLF Eye Clinic is \$157,696, or \$302 per eye surgery.

The medical supplies purchased, typically medications and intraocular lens implants, are the one item that varies from year to year because it depends on how many supplies are donated. The medical supply expense for 2009 is fairly typical. In contrast, the medical supply expenses of \$108,619 in 2008 were high because donations were unusually low. Until HDLF has better data on donations of medications and intraocular lens implants, we assume that the difference between the 2009 and 2008 medical expenses represents the average value of donated supplies. We estimated the medical expenses per eye surgery to be \$24 in 2009 and \$82 in 2008,<sup>33</sup> and the difference is \$58 per eye surgery. We estimate the cost of donated time to be \$192 per surgery, giving a total of \$552 per surgery if estimates of donated supplies and time are included.<sup>34</sup>

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<sup>30</sup> Calculated from interpolation of Guatemala life expectancy at age 70 (85.7 for male, 86.7 for female) and at age 75 (87.4 male, 88.3 female). WHO data <http://www.worldlifeexpectancy.com/country-health-profile/guatemala>

<sup>31</sup> These are the costs borne by the U.S. group, which pays for the U.S. medical teams and the hospital expenses while running the clinics, and for construction and maintenance costs of the hospital buildings. It excludes the costs borne by the hospital for the treatment of patients during the rest of the year, primarily by nuns. There are four clinics per year with approximately 50 medical staff per clinic.

<sup>32</sup> We assume that the Eye Clinic accounts for one-half of all medical and overhead costs because cataract surgeries were one-half of all surgeries in 2009. Eye clinic construction costs were \$40,000 depreciated over 20 years, with a carrying cost of foregone interest of 3% per year included.

<sup>33</sup> We multiplied total medical purchases by proportion of surgeries that are by Eye Clinic (0.68 in 2008 and 0.50 in 2009), and divided this expense by number of eye surgeries (894 in 2008 and 522 in 2009).

<sup>34</sup> The cost of cataract procedures in the U.S. provides data to estimate donated time and materials, and also provides an interesting comparison to the costs at HDLF. The average reimbursed cost per procedure for cataract surgery in the U.S. is \$973. A surgeon receives \$606 and the attending staff receives \$121 per procedure. In addition, the surgery center receives \$246 for costs of material, medications, anesthetics, and lens implant. The

Comparing the QALY lifetime benefits per patient and the costs per surgery, we see that the average 9.4 additional years of quality life costs HDLF only \$32 per additional year of quality of life (out-of-pocket costs), or \$59 per additional year of quality life if we include donated time and materials. This appears to be an excellent social investment.

## **Pilot Project: Financing Producer Cooperatives on Two Continents**

### **Introduction**

Dairy Fund (fictitious name) is a non-governmental organization (NGO) that provides loans to producer-owned cooperatives (Coops) in the dairy industry. Many small scale producers organize into Coops to market their goods collectively; the collective marketing allows them access to broader markets, such as export markets with higher prices. These Coops must have access to credit in order to pay their member producers for their future output while the products are in process (and in inventory) and to invest in marketing operations and cooperative equipment. The purchase of future product from producers provides them with the funds required to sustain their operations between the time of production and receipt of payment from the sale of the product, which can be months after inputs have been purchased. Dairy Fund provides financing to producer-owned cooperatives throughout the developing world, most of whom would otherwise be unable to get access to credit.

### **Key Impact Question**

What is the relationship between the disbursement of a loan and a cooperative's ability to achieve the following outcomes? (These are stated in order of impact on stated outcomes, with each outcome affecting the next outcome.)

- increase purchases from producers (members), and increase sales/revenues from final sales (especially exports);
- stabilize pricing and members' income over the production cycle;
- allow planning and investment by the Coop and by members;
- increase use of value-added inputs, such as capital equipment;
- increase growth of Coop and member incomes over time;

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surgeon receives an average of \$2000 per day, or performs 3.3 cataract operations. Here we see that the cost associated with the medical personnel at HDLF is \$208 per surgery, which compares to \$727 per surgery in the US. However six surgeries are performed daily per surgeon at HDLF and 3.3 surgeries are performed daily per surgeon in the US. If the US daily medical personnel costs are spread out over 6 surgeries instead of 3.3, the medical staff costs per surgery are \$400. We assume that the difference between out-of-pocket costs for medical personnel (\$208) and US medical staff costs (\$400) is the value of the donated time (\$192). If we add this value of donated time and of donated materials (\$58, see text) to the out-of-pocket costs, the total cost per cataract surgery is  $\$302 + \$192 + \$58 = \$552$ .

- increase household expenditures on health and education that is made possible by improved member incomes.

To evaluate the impact of their loans to the Coops, Dairy Fund would like to track how providing their loans is related to a Coop's ability to purchase from its members, to the Coop's net revenues, and to the members' net income. Although we would like to answer all of the subsidiary questions posed in the Key Impact Question above, our data allow us to focus on the first and second direct impacts—the increase in purchases from members (producers) and final sales to global markets; and stabilization of pricing over the product cycle. In the future, data will be available to look at the other impacts on the Coop's activities and members' incomes.

### **Data and Methods**

In this report, we use Dairy Fund's routinely collected data for a single year (2008) to do a ReadyMade Impact Assessment. We have data on 102 Coops, and information such as the age of each Coop, whether or not the Coop uses conventional commercial bank financing, and the number of members in the Coop. First we identify one key outcome variable. We also identify control variables for the Cooperatives' characteristics. We then use linear regressions to show the relationship of Dairy Fund loans with Coop performance while holding controls constant.

Identifying Key Variables. In keeping with the ReadyMade tenet to keep the analysis simple, we look for one key outcome variable that is highly correlated with the other available outcome variables that provide measures of the Coop's annual performance. The key outcome variable should represent the Coop's improved performance that can be linked to Dairy Fund financing. Three variables collected by Dairy Fund could possibly serve as measures of performance: total purchases from producers, total sales, and total revenue. The first step of the ReadyMade process is to investigate if these variables move together or provide different information. We find that the three variables are correlated at the 0.9 level (or higher); they perform statistically in a similar manner. Therefore, we narrow our investigation to *one key performance variable*, "total purchases from members", which provides similar results as using any of the other available outcomes variables (confirmed by our statistical analysis).

Controls. In the linear regression below, we control for environmental characteristics—global location (by continent), daily minimum wage; and Coop characteristics—age, number of producers in the Coop, capital per producer, quality assurance certifications (e.g., organic), and commercial bank financing. To control for the size and efficiency of a Coop, we use the number of years the cooperative has been in existence (i.e., its age). The assumption is that as a Coop matures, the number of producers and revenues will increase. We also control directly for size, using the number of producers and the capital per producer. Dummies for quality assurance certifications are used to control for access to premium markets. An indicator variable for whether or not the Coop has financing from a commercial bank is used to control for each

Coop's access to sources of liquidity other than those loans provided by Dairy Fund. To control for regional conditions, we group Coops from different countries by continent. The daily minimum wage (i.e., the minimum wage for a day's work) is used as a proxy for the Coop's economic environment and local labor market.

We predict that the amount of the Dairy Fund loan has a positive relationship with a Coop's ability to purchase from member producers, given the controls. Here we present the statistical relationships observed in 2008. Multi-year data would strengthen the analysis by showing the relationships among key variables over time.

### **Relationship between Coop Performance and Dairy Fund Loans**

In our regression analysis of the relationship between Coop performance, proxied by purchases from members, and Dairy Fund loans, we found that one simple linear regression provides a good summary of this relationship: the quantity of purchases from members regressed on Dairy

<b>Regression</b>	<b>Coef.</b>	<b>Std. Err.</b>
<b>Purchases from Members</b>		
Dairy Fund Loans (000s dollars)	2.00***	0.586
Number of Producers	.780***	0.166
Capital per Producer	117.3**	57.5
Age of Coop	82.0***	20.6
Quality Assurance A	-1172	753
Quality Assurance B	3,772***	867
Continent dummy	2,270**	973
Daily Minimum Wage	-94.6	70.5
Finance from Commercial Bank	-54.9	62.3
Constant	-2464	896
Adj R2 = 0.59		

\*\*\*Significant at the 1% level.

\*\* Significant at the 5% level.

\* Significant at the 10% level.

Fund loans, while controlling for the eight relevant variables. This regression reveals a strong positive and highly significant relationship between Dairy Fund loans disbursed and purchases from members. Five controls are significant (number of producers, capital per producer, age of Coop, quality assurance B, world region) and three controls are insignificant (quality assurance A, daily minimum wage, and an indicator for whether the Coop has commercial bank financing).

**The regression indicates that Dairy Fund loans have a positive relationship with Coop purchases: every \$1 of Dairy Fund Loan's disbursed to Coops is associated with an increase of \$2 in Coop purchases from members.** This statistical relationship suggests that Dairy Fund loans are accomplishing their goal of improving the Coops' ability to make purchases from members through improved liquidity.

With increased liquidity, Coops have more cash on hand to make purchases from members at the beginning of the production cycle, before the Coop receives payment from future contracts with buyers. By selling the product to middle men rather than a Coop, producers may forgo export or quality assurance premiums and future dividends in exchange for a larger immediate payment at local prices. Providing Coops with working capital allows them to make purchases in an ongoing relationship with producers and reduce the variability of income over time. This allows the Coop and its members to plan investments to improve productivity and product output.

Price. Now we turn to the second potential impact—the prices received by members for their product and the variability of these prices over the production cycle. The price a cooperative is able to pay its members for the products is a useful variable for measuring the impact on members' income. The Coop helps its members by increasing export sales and by providing a contract price and guaranteed sales early in the season. Members benefit from the higher export price compared to the local market ("local price"), and from the stability of the price over the cycle and from partial early payment for future delivery, which allows them to plan and invest their income. Liquidity provided by Dairy Fund loans improves the Coop's ability to contract guaranteed sales early in the season that reduces uncertainty for members. The Coop absorbs the risk of falling prices over the production cycle, and the benefits of rising prices are shared by both Coop and members. Overall the price to members would hopefully match the average market price paid over the cycle, with lower variability. The cooperatives want to cover costs plus a normal margin that allows them to make future investments.

Here we examine the price variables available for 2008 for one of the cooperative's important products: the average price paid to members by the Coop, the average local price, the Coop's average sale price, and Coop's sale price for export only. Only about one-half of the Coops have data for all four price variables, and we use correlations and linear regression to compare the prices for this subgroup of Coops. We also look at the ratio of the price that members

receive compared to the price the Coop sells the product for, as this ratio can be used to indicate the Coop’s role in stabilizing prices.

Correlations for the four price variables and the ratio are below. We observe that the price a cooperative eventually receives for its product (Coop sale price) correlates positively with the price offered to members (Member price) and negatively with the local market price, and moves closely with export price. This indicates that the Coop sells to the more lucrative export market rather than the local market. Now consider the Coop’s price paid to members as a percentage of the Coop’s sale price. We find that this percentage moves inversely with export prices (and Coop’s sale price): As the export (or sale) price goes down, the percentage of that price that is paid to the producer goes up. This simple statistical relationship indicates that the Coop is taking some of the downside risk of price movements.<sup>35</sup> When there is an upward movement in export prices, the Coop achieves higher margins. Overall the Coops appear to stabilize the prices paid to producers over the production cycle.

**Correlation of Price Variables (55 cases)**

	Member Price	Local Price	Coop Sale Price	Export Sale Price
Member Price	1			
Local Price	-0.152	1		
Coop Sale Price	0.217	-0.245	1	
Export Price	0.161	-0.186	0.974	1
Member Price as % of Coop Sale Price	0.887	-0.024	-0.226	-0.266

Correlations above or equal to the absolute value of .266 are significantly different from zero at the 5% level and of .225 are significant at the 10% level..

**Summary of Dairy Fund Impact**

We use Dairy Fund data to provide a ReadyMade impact analysis based on key variables and relationships, which will complement a planned rigorous impact analysis that will be conducted by Dairy Fund, based on a small group of Coops compared to a control group. Once the causal relationships are documented, along with the broader impact on the Coop’s families and community, then the results can be expanded to all the Coops using the ReadyMade analysis. The simple ReadyMade analysis can also be extended over time to document trends. In general ReadyMade can be used to extend the findings of the rigorous analysis to estimate the impact of

<sup>35</sup> One could expect some mechanical negative correlation between variables defined in this fashion, especially in the case that there is a large amount of reporting error.

Dairy Fund loans on Coop performance and community living standards over time and across cooperatives.

The ReadyMade analysis statistically demonstrates that a few key variables can be collected from all Coops and used to assess Dairy Fund's impact on an annual basis, with a cost-effective analysis based on simple statistical relationships. Periodically a more rigorous study can be conducted in order to verify these relationships and to benchmark the rigorous findings to the key ReadyMade variables, both across Coops and over time.

### **Overall Summary**

ReadyMade provides an open source, user-friendly method for social enterprises to conduct an impact analysis of a specific program for reports to donors and for their own internal evaluation. The goal of ReadyMade is to provide organizations with an inexpensive way to conduct assessment of a program that provides valuable knowledge about the program's impact, and that uses data already being collected or can be easily collected. With ReadyMade, social enterprises have an alternative to hiring a consulting firm, usually costing \$50,000 or more, to conduct an expensive impact assessment or to trying to use on-line programs that require large amounts of specific data without providing analysis of data; these top-down programs are not tailored to reflect the enterprises' program goals, operations, and needs.

Using key variables and simple statistical analysis, the social enterprise can use ReadyMade to identify how key variables for inputs are related to key variables for outcomes, and how these relationships move over time. Linking the ReadyMade variables to more rigorous studies allows the organization to describe how their services or products are having an impact in a broader context and allows the organizations to scale their impact analysis across sites and over time. Because ReadyMade impact analysis is simple and easy to do and will be freely available online, organizations can continue to apply it annually and document trends that are valuable for understanding how their programs are having an impact.