



# Cost Analysis of the Tandem Teen Parenting Program

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September 30, 2008



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## EXECUTIVE SUMMARY

The Tandem Teen Prenatal and Parenting Program provides medical, mental health, educational/vocational services and social support to pregnant/parenting teens. The program aims to improve the health and well-being of teen mothers and their children and to reduce the incidence of additional pregnancies for these young women. The program is an interagency collaboration lead by People's Community Clinic. The present study provides a cost analysis of the Tandem program, examining costs in three ways a) cost comparison b) cost effectiveness, and c) cost-benefit. Key findings are outlined below:

### **The Tandem Teen Parenting program represents a reasonably priced medical interventionist model for pregnant and parenting teens and their children.**

- Tandem is a moderately priced program, costing \$1,900 per participant. Tandem costs are slightly higher than those of existing social service models (\$1,340-1,644).
- Tandem costs are less than half that of the Nurse Family Partnership program (\$4,500), the most widely endorsed medical model of teen parenting programs.

### **Tandem is a cost effective program.**

- Cost effectiveness is the cost per successful outcome (cost/number of teens avoiding a subsequent birth). Lower figures represent a more efficient program.
- The cost effectiveness estimate for Tandem is \$4,265 compared to \$5,114-\$5,769 for the Nurse Family Partnership, which represents the gold standard for effective parenting programs for young low-income mothers and their children.

### **Tandem provides a substantial return on investment (ROI).**

- We estimate that the Tandem program is associated with approximately 6 fewer subsequent births and 6 fewer cases of child abuse/neglect than could be expected from the teen parenting population that does not receive specialized services. There are significant financial benefits of these improved outcomes (less high school dropout, lower health care costs, reduced welfare costs, less time in foster care, etc.).
- This report estimates these costs and compares them to the costs of the program. The result reveals that the Tandem program produces a net profit of approximately \$503,112, or a return of **\$2.34** for every dollar invested.

**On all three dimensions the Tandem program exhibits a strong performance. It is a program that produces substantially improved outcomes at a relatively low cost. It has distinguished itself from among the numerous unprofitable programs in existence and profiled among the ranks of the top performing programs in the country. Tandem is clearly a wise investment, making a contribution to teen mothers, their children, and the community at large.**

## Introduction

St. David's Community Health Foundation currently provides funding for the Tandem Teen Prenatal and Parenting Program. The program is designed to provide medical, mental health, educational/vocational services and social support to program participants. The program aims to improve the health and well-being of teen mothers and their children and to reduce the incidence of additional pregnancies for these young women. The program is an interagency collaboration with services provided by People's Community Clinic (lead agency), Any Baby Can, Child and Family Resource Center, Lifeworks, and Austin Child Guidance Center. Dr. Carol Lewis, Associate Director of The Center for Social Work Research at the University of Texas, is conducting a comprehensive five-year evaluation of the Tandem program. That evaluation is currently in its third year. The present study provides a cost analysis of the Tandem program to supplement the existing evaluation. This study evaluates costs in three ways a) cost comparison b) cost effectiveness, and c) cost-benefit.

## Background

Teen pregnancy and parenting is a pressing concern in the United States. Despite significant declines in the last decade, the United States still has the highest teen pregnancy and birth rates in the industrialized world. In addition, teen birth rates in Texas are the highest in the nation. Texas also leads the nation in the highest percentage of teen births that are subsequent births (24%).<sup>1</sup> Teen childbearing is problematic because of its associated adverse consequences. Children born to teen mothers have more health problems, lower levels of cognitive functioning, are more likely to be abused or neglected, have lower levels of educational attainment, more welfare dependence, and a greater likelihood of incarceration as adults than are children born to non-teen mothers. In addition, teen mothers are less likely to finish high school and more likely to use welfare than are non-teen mothers. Thus, there are important personal consequences for teen mothers and their children. In addition, these poor outcomes represent a significant cost to taxpayers.<sup>2</sup>

Teen pregnancy has received a tremendous amount of attention from researchers, service organizations, and policy makers. A wide variety of programs have been developed to reduce teen pregnancy and/or mediate the negative consequences of it. A number of teen parenting/prevention programs have had minimal effect on outcomes, raising the issue of whether these programs should continue to receive funding. Others have seen some improvements in outcomes, however, it is unclear whether the benefits outweigh the costs of these endeavors. Thus, a number of cost analyses have been conducted. Funding agencies understandably wish to invest in those programs that make the most effective and efficient use of the available monies. These cost analyses have offered valuable insight on the return on investment that is possible with these programs. Consequently, it is important to thoroughly evaluate the Tandem program in order to understand its ability to achieve the desired outcomes and whether the investments in this particular approach to teen parenting is optimal.

The Tandem program was implemented in 1998. It is a home and school visitation program with case managers providing prenatal and parenting education, as well as social services, on their visits. The most recent grant application best describes the mission of the program. It states

“The Tandem Teen Prenatal and Parenting program is an interagency collaboration designed to provide medical, mental health, education/vocational, and social support to low-income young parents and their children. The program goals are to promote the health and well-being of participating young families and to reduce their risk of subsequent unplanned pregnancies.”<sup>3</sup>

Tandem serves the vulnerable population of low-income, predominately Hispanic, pregnant teens (most under 17). The Tandem partner agencies are People’s Community Clinic, LifeWorks, Any Baby Can Child and Family Resource Center, and Austin Child Guidance Center. People’s Community Clinic is the lead agency and Robin Rosell is the Tandem program director.

Tandem provides a tiered system of service delivery, based on client need. There are three groups in this tiered approach. Level I teens are described as low risk. These clients receive standard medical care and prenatal/family planning health education. These are services that all pregnant patients would ordinarily receive at People’s. The Level II teens are considered intermediate risk. These clients receive standard medical and educational services. In addition, they receive medical case management and social work consultation and community resources referrals. Those in Level III, high risk, are those who receive the services of Level II with the addition of intensive case management, prenatal, child development and parenting education, and mental health services. Because participants in Levels II and III receive the unique services of the Tandem program, benefits that are not typical of the general primary care experiences of most mothers, we focus our analysis on clients in these groups.

Dr. Carol Lewis, of the University of Texas Center for Social Work Research, is currently conducting an evaluation of the Tandem program. Her work is part of a five-year study funded by the Federal Office of Adolescent Pregnancy Programs’ Adolescent Family Life Care Demonstration Grant. This evaluation examines program processes and participant outcomes. Outcomes include use of contraception, rate of subsequent pregnancies, immunizations, parenting skills, educational attainment/progress, involvement of fathers, and emotional well-being. This evaluation will provide much needed information on service utilization, program outcomes, and the strengths and weaknesses of the intervention.

The University of Texas study will provide a comprehensive evaluation of the Tandem program. However, those committed to improving the outcomes for teen parents are not only interested in whether those improvements occur, but whether they improve more than for other available programs and whether the improvements are substantial enough

to justify the program costs. Thus, the present study offers a cost analysis of the Tandem program to supplement the UT evaluation. These types of analyses have proven critically important to funding agencies and policy makers. Washington State Institute for Public Policy recently conducted an extensive review of the available cost analyses for all prevention and early intervention programs targeting youth. Their study was a response to a question posed by the Washington State Legislature, which was, “Is there credible scientific evidence that for each dollar a legislature spends on research-based prevention or early intervention programs for youth, more than a dollar’s worth of benefits will be generated? If so, what are the policy options that offer taxpayers the best return on their dollar?”<sup>16</sup> The study was impressively thorough in terms of the number and range of programs evaluated, the sophistication of the economic models used, and the clarity of the conclusions. The principal conclusion was that some prevention and early intervention programs for youth give a good return on investment, achieving significantly more benefits than costs. Their recommendation was that investments be made in programs that have been able to demonstrate an ability to achieve desired outcomes and to produce a net return on their investment as well. This study aims to evaluate the Tandem program with these goals in mind.

## **Methodology**

The proposed research will examine costs in three ways by providing a cost comparison, a cost effectiveness analysis, and a cost-benefit analysis. The following chart outlines the objectives of these three cost analyses, the data sources and the analytic approach associated with each. A more detailed discussion of the methodology follows.

**Table I: Tandem Cost Analysis Methodology**

<i>Analysis Type</i>	<i>Objective</i>	<i>Data Source</i>	<i>Analytical Approach</i>
Cost Comparison	Compare Tandem costs/participant to that of other teen parenting programs: -Nurse Family Partnership-Denver - Project Reach FWISD -Methodist Healthcare Ministries: Project MELD	Annual costs for 2007 and number of participants served obtained from agency records	Total annual costs 2007/number of participants in 2007, estimated for each program
Cost Effectiveness	Calculate cost/outcomes (cost effectiveness) for Tandem and compare to the Nurse Family Partnership (NFP)	Cost estimates provided by agencies. Outcome: subsequent birth rate: -Tandem data -NFP estimates obtained from the literature	Cost effectiveness (for each program)=Total program costs in 2007/# of teens without a subsequent birth within two years
Cost-Benefit Analysis	Calculate the net benefit of Tandem outcomes (benefits-costs). Outcomes measured are: -rate of subsequent births (in 2 yrs.) -child abuse/neglect	Tandem costs -2007 grant proposal Tandem outcomes -Tandem data Outcomes for teen parents not receiving services -Literature Monetary benefits of outcomes -Literature	Net benefit= Benefit-Costs where benefits=(Tandem outcomes-expected outcomes)(cost of outcome) and Costs=total Tandem costs for 2007

## *Cost Comparison*

At the most basic level cost analyses examine the average cost per patient served for a program and compare that to the average cost per participant for similar programs. We calculate this estimate for Tandem for the year 2007 by taking the total program costs and dividing by the number of patients served in 2007. As mentioned, we define patients served in 2007 as those receiving services, either as new patients or existing patients and which are in the Level II or Level III category. These patients receive an enhanced model of care, beyond typical prenatal care services. While Tandem does offer services to a small number of fathers, we do not include them in our analysis. We replicate this analysis for other reputable programs that target young mothers and their children. St. David's requested that the following programs be used for the cost comparison; The Nurse Family Partnership (based in Denver), Project Reach from the Fort Worth Independent School District, and Project MELD supported by the Methodist HealthCare Ministries in South Texas. We obtained program descriptions and costs from program directors. This analysis allows us to see if the Tandem cost per patient is comparable to other programs that attempt to improve the outcomes for teen parents and their children.

## *Cost Effectiveness*

While overall cost comparisons are useful, costs relative to outcomes are a more sophisticated way to determine if a program is financially justified. While the Nurse Family Partnership (NFP) acknowledges they have a high cost per participant (even in their brochures they mention that they are expensive), they argue that they are effective. The NFP has achieved impressive outcomes and therefore many believe the cost is justified. This type of analysis, examining costs relative to outcomes is called a cost effectiveness analysis. It is particularly useful for comparing two programs with differing costs, but which have similar goals in terms of outcomes.

In the original proposal for the cost analysis, we proposed to conduct a cost effectiveness analysis for Tandem relative to the Lifeworks Teen parenting program in Austin. The Lifeworks approach is more of a social service model rather than a medical model. However, we learned from the University of Texas evaluation team and from Tandem staff that there is tremendous overlap between the Tandem program and that of Lifeworks. Because they are both part of the collaborative effort to provide services to pregnant/parenting teens, we could not view their participants as discrete non-duplicated patients. Thus we chose not to use Lifeworks as our comparison for the cost effectiveness analysis, but to use the Nurse Family Partnership as our point of comparison.

An analysis of the NFP program relative to Tandem has significant limitations. We do not have access to NFP raw data for our own comparisons. We must rely on the literature to provide the estimates of costs and outcomes. In addition, the NFP serves low income

first time mothers in general, not just teens. However, the majority of NFP participants are teens and it is the most rigorously researched parenting program for young disadvantaged mothers.<sup>4</sup> The Tandem and NFP programs are also very similar in that they provide a medical model of care, home visitation, and share many of the same goals in terms of outcomes. Finally, the NFP is the most widely endorsed model for serving low-income young mothers and their children. For these reasons we feel that the NFP represents the best option for gauging the cost effectiveness of the Tandem program.

A goal that all teen parenting programs share, including Tandem and NFP, is to reduce the rate of subsequent and closely spaced pregnancies/births. This is a critical goal because the rate of subsequent births to teen mothers is 24%.<sup>5</sup> Having an additional child, spaced closely (within two years of the first child), significantly increases the negative consequences for teen parents and their children. Approximately 50% of teen mothers graduate from high school. That rate drops to 15% if they have a second child within two years.<sup>6</sup> Second children have worse birth outcomes, more long-term health problems, and lower levels of educational achievement than the first-born child.<sup>7,8,9</sup> Many argue that reducing the rate of subsequent pregnancies is perhaps the most changeable and important outcome for teen parents. Thus, we chose the rate of subsequent births as the central outcome measure for the cost effectiveness analysis. For the analysis we take the total annual costs of the program and divide by the total number of girls in the program who did not have a subsequent birth within two years of the first birth. This analysis allows us to see the cost per “successfully served participant”. The lower the figure the more effective and efficient the program is at attaining its goals.

### *Cost-Benefit*

Cost-benefit analyses offer a comparison of what the program costs relative to its benefits. In these analyses benefits are conceptualized in financial terms so that a simple calculation can be made. The result is either that the program costs more than it produces or that the benefits of the program meet/exceed the costs for a net profit, so to speak. Estimates of the rate of return (ROI) are usually offered. Cost-benefit analyses are easy to interpret because the goal is simply for benefits to at least meet or exceed costs in order to justify the program expenditures. While cost-benefit analyses are valued for their ease of interpretation and simplicity, they are anything but simple. Program costs are relatively easy to estimate. However it is particularly challenging to construct estimates of the monetary benefits associated with both the short and long term outcomes of the program. We often have data on only a sample of program outcomes and we often lack financial estimates of the benefits of measured outcomes. Most importantly cost-benefit analyses are limited by defining benefits in only financial terms. Some benefits are easily monetized. For example, if a program reduces the incidence of child abuse and neglect, we can determine cost savings in child protective services investigation and foster care expenses by having this lower rate of maltreatment. However, the benefits of a child avoiding abuse/neglect are obviously much more than the aversion of interventionist costs. The cost of the short and long-term problems these children face is difficult to estimate and the emotional strain they cause cannot be assigned a dollar value. In sum, cost-benefit analyses can be very interesting and valuable in that they document the cost

of the intervention relative to the cost of not having it (opportunity cost). However, the cost of not having it can never truly be captured in financial terms. Thus all cost-benefit analyses likely underestimate benefits. Because of their limitations, cost-benefit analyses must be viewed in conjunction with other types of evaluation data. However, they are a useful step to elucidate what is often forgotten, that there is a financial cost of inaction that, to some extent, can be quantified. In addition, cost-benefit analyses are used regularly and valued because they provide rough estimates of whether a program's outcomes offer any financial benefits, examines the accrual of benefits over the long term, and assess whether social programs might over time actually come to represent a savvy investment in addition to a charitable contribution.

For our cost-benefit analysis we draw upon the methodologies of numerous cost-benefit analyses. However, our approach most closely reflects that outlined by DeBord (2007), who convincingly argues for comparing national data on outcomes to those outcomes achieved by a program to offer a pragmatic cost-benefit analysis that is accessible to a broad array of existing stakeholders.<sup>10</sup> Thus, we examine the outcomes for the Tandem program relative to what the outcomes would have been without the program. We then determine the net improvement in outcomes provided by the program. Next, we estimate the benefit (or cost savings) that this net improvement represents. We use Tandem data collected by People's Community Clinic to identify Tandem outcomes. We use existing literature/research on outcomes for the general teen parent population to have a baseline of what would have happened in the absence of the Tandem program. We also use existing literature to estimate the costs of these outcomes in order to determine the net benefits of the Tandem program.

We identified two outcomes which could be used to conduct the cost-benefit analysis; subsequent births and reported incidences of child abuse/neglect. These outcomes are high priorities for the Tandem program and a strong representation of the program's performance. They are also outcome measures that are available for Tandem participants, available in the literature for teen parents not receiving specialized services, and for which the benefits have been monetized in the literature. The following formulas provide the conceptual and empirical approach to the cost-benefit analysis.

## 1. Net Benefit = Benefits – Costs

(A.) Benefits = (Reduction in subsequent births associated with Tandem)\*(cost of subsequent birth) + (Reduction in reported incidents of child abuse/neglect associated with Tandem) \*(cost of child abuse/neglect)

- (a.) Reduction in subsequent births for Tandem teens= ((Number of subsequent births that would have occurred for Tandem participants if the rate of subsequent births were similar to that of the general teen parent population - number of subsequent births for Tandem participants)
- (b.) Reduction in child abuse/neglect = ((Number of reported cases of child abuse/neglect that would have occurred for Tandem participants if the rate of abuse/neglect were similar to that of the general teen parent population - number of actual reported cases of abuse/neglect for Tandem participants)

(B.) Costs = Total program costs of Tandem in 2007

In the results section that follows we breakdown each of these components and how outcomes and associated costs were calculated and provide the emergent findings.

## Results

### *Cost Comparison*

We compared the costs per participant for the Tandem program to three other reputable teen parenting programs. These programs are the Nurse Family Partnership, Methodist Healthcare Ministries Project MELD, and Project Reach-Fort Worth ISD. A brief description of these programs is provided below.

Nurse-Family Partnership: The Nurse-Family Partnership program is a prenatal and infancy nurse home visitation program that serves low-income first-time mothers and their children. This program originated in Denver and has been successfully replicated in numerous cities across the country. It is administered by state and local public health agencies in partnership with the Nurse-Family Partnership National Service Office. The program serves between 100 and 200 families per year. There are four-eight nurse home visitors, each with a caseload of 25 families. The nurse home visits usually begin in the first trimester and continue until the child's second birthday. The Nurse-Family Partnership Program has been rigorously evaluated in randomized, controlled trials. The program has been found to produce improvements in prenatal health, birth outcomes, child development, school readiness, academic achievement and maternal employment. It has also been shown to reduce subsequent births, child abuse and neglect, early childhood injuries, mental health problems, and crime.<sup>11</sup> The NFP program appears to be

the gold standard of programs for low-income first time mothers. Issacs from the Brookings Institution, in her article, “Cost Effective Investments in Children” proposes a nationwide program of nurse family visiting programs for all low-income first time mothers with the Federal Government paying for 80% of program funding.<sup>12</sup>

The NFP is the program most similar to Tandem because it is a medical rather than a social services model. Both programs offer home visitation and follow the families for approximately 2-3 years after the birth of the child. However, the NFP program is different from Tandem in a few important areas. The most important difference is that the program targets first time low-income mothers. While the majority of their participants are teenagers, it is not a program specifically for teenagers. In addition, while Tandem home visits (or school visits) are conducted by caseworkers, nurses offer visitation with the NFP program.

Project Reach-Fort Worth Independent School District: Project Reach is a school-based program for pregnant and/or parenting teens. They have 5 social workers and one counselor that cover the entire school district and serve to supplement the support services that exist in the schools already. It is an in-school case management program, including high schools and middle schools. They also help to coordinate support services such as prenatal care, transportation, community funds scholarships, and childcare. They serve about 500-600 kids a year, most mothers (about 50 fathers). They also have a separate new life school for teens who need more structured intensive case management.

Methodist Healthcare Ministries-MELD Program: Methodist Healthcare Ministries developed its parenting programs in 1997. They offer peer based programs that allows new parents to learn and receive support from others who are currently in a similar situation. They offer two programs, MELD and PHP (parents helping parents). MELD appears to be the program most comparable to Tandem. MELD provides services to those aged 13-25 who are pregnant or parenting. The program has a long-term focus with services provided for up to two years. The majority of the participants are mothers however, MELD also offers services to young fathers as well. MELD offers case management, weekly support group meetings and information on child development. The program also provides food, transportation, childcare and recreational activities for participants. A highlight of the program is a family field trip offered to participants each year. The MELD program is a social services, rather than, medical model. However, they do make referrals for prenatal care and provide healthcare and dental care to those who aren't insured.

The table that follows provides a cost comparison of Tandem with these three programs, examining the average cost per participant served in 2007.

**Table II: Comparison of Average Cost per Participant in 2007**

<i>Program (2007)</i>	<i>Total Cost</i>	<i># Participants</i>	<i>Avg. cost/participant</i>
Tandem	\$375,821	192	\$1,900
Nurse Family Partnership	\$450,000	100	\$4,500
Project Reach-FWISD	\$879,499	535	\$1,644
Methodist Healthcare Ministries-MELD	\$973,823	727	\$1,340

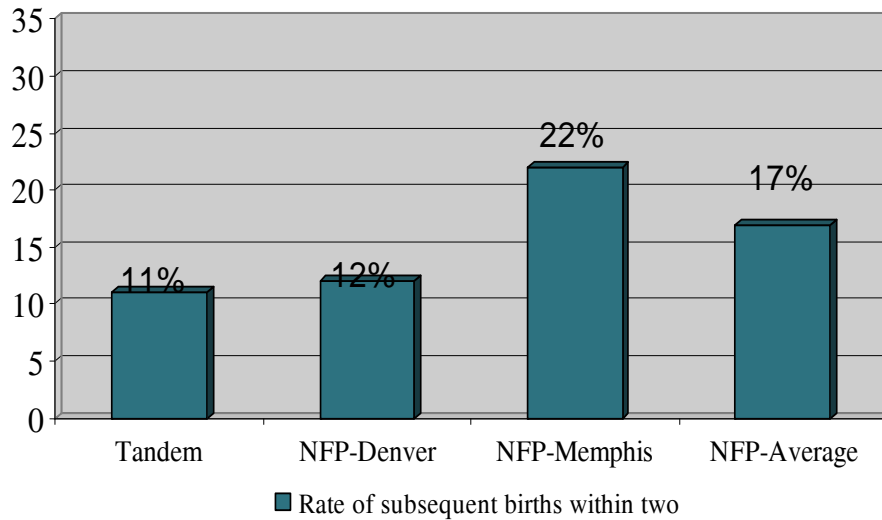
Table II reveals that the NFP program has the highest average cost per participant of all the programs. This is largely due to the expense of full-time nurses, which conduct home visitation. Tandem has the second highest cost/participant. However, their costs are more closely aligned with the social services models. While Tandem is also a medical model, its costs are less than half the cost incurred for the NFP. Overall, Tandem costs appear to be relatively moderate and inexpensive compared to the most widely endorsed medical model of parenting programs to low-income first time mothers.

### *Cost Effectiveness*

The cost effectiveness analysis examines costs relative to outcomes for Tandem and the Nurse Family Partnership (NFP). Our outcome measure for the analysis is the rate of subsequent births within a two-year follow-up period. We obtained the rate for Tandem participants from the data collected by People’s Community Clinic. PCC collects data on the outcomes for the teens considered the “core” of the Tandem program, those who receive the full benefit of Tandem services (and who are in the highest risk category). The estimates for the NFP come from the literature. There are two studies of the NFP program which provide the rate of subsequent births within a two-year follow-up period. One study was conducted in Denver, Colorado.<sup>13</sup> This sample most closely approximates that of Tandem. The sample was of low-income women from a metropolitan area. Approximately 44% of the participants were Hispanic. The other study was conducted in Memphis, Tennessee with a predominately urban, low-income, African American

population.<sup>14</sup> These two studies reveal that the NFP program was able to significantly reduce the rate of subsequent births to the young mothers served by the program (in comparison to a comparable group of mothers not receiving the NFP services). However, the rate of subsequent births for the NFP participants varies considerably depending on which study is examined. The chart below displays the rate of subsequent births for Tandem relative to the NFP studies.

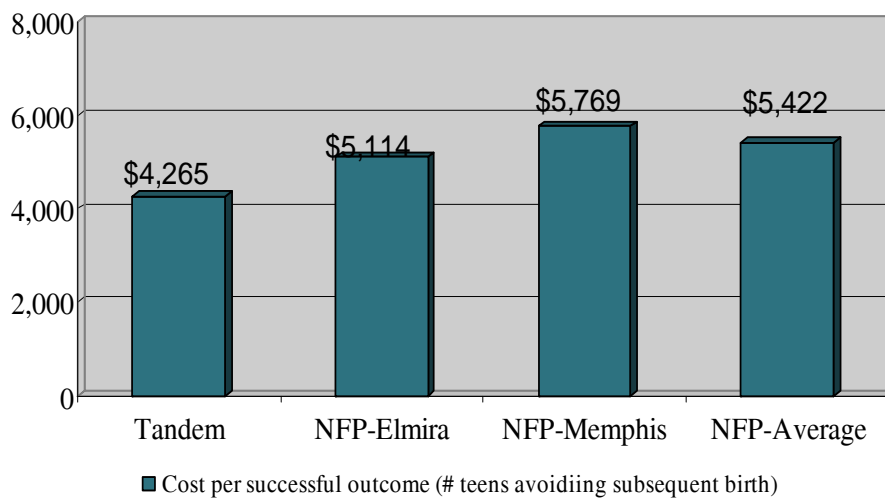
**Outcomes for Tandem and the NFP**



The chart above reveals that regardless of whether we use the Denver estimate, the Memphis estimate, or the average of the two, Tandem has a lower rate of subsequent births (11%, n=114) than the NFP program. This is quite impressive since we are only able to estimate subsequent births for the Tandem core. These participants are the youngest participants. Their average age is 15 whereas the average age for the NFP participants is 19-20.<sup>15,16</sup> We know that the risk of subsequent pregnancy is higher for younger teens.<sup>17</sup> Thus, while Tandem teens are demographically higher risk than the NFP participants, they have a lower rate of subsequent births in the follow-up period. We use this important outcome to assess cost effectiveness.

To calculate cost effectiveness we use 2007 costs for the Tandem program divided by the number of participants who avoided a subsequent birth in the two-year follow-up period. This provides an estimate of the cost per successful outcome. We use the estimate of the 99 core participants served in 2007. We conduct the sample calculations for the Nurse Family Partnership using their costs for 2007, which are estimated for a sample of 100 participants served in that year. The chart below provides the results of the cost effectiveness analysis. The lower the figure, the more cost effective the program (an efficient use of funds).

**Cost Effectiveness: Tandem and the NFP**



The promotional material for the Nurse Family Partnership emphasizes the cost effectiveness of the program, noting that costs are rather high, but that costs relative to outcomes are relatively low because the outcomes for the program are so strong. Using the outcome of subsequent births, we see that the Tandem program is also a cost effective program, with costs per successful outcome even lower than that of the NFP. Given that the NFP is widely touted as a cost effective social program, we can convincingly argue that the Tandem program also is a cost effective approach to serving the vulnerable population of teen mothers and their children.

We acknowledge that we only examine one outcome measure in our cost effectiveness analysis. The NFP program has produced a number of other important outcomes not captured here, such as improved child development and school readiness and reductions in childhood injuries.<sup>18</sup> We do not use these, or other outcomes in our analysis because we do not have sufficient data on these outcomes for both programs. However, the rate of subsequent births is arguably the most critical outcome for these programs and one which is likely highly correlated to other outcomes. It is thus an excellent proxy for whether the

programs are accomplishing their goals and improving the well being of teen mothers and their children.

### *Cost-Benefit*

The cost-benefit analysis reveals whether the monetary benefits of the program meet/exceed the program costs. As mentioned, we focus on two outcomes (and their associated benefits), rate of subsequent births and reported cases of child abuse/neglect. The following discussion provides information on Tandem outcomes for these measures and what outcomes might have occurred without the program (for teen parents without specialized services) to determine the net benefit in outcomes likely produced by the Tandem program. We then use existing literature to estimate the monetary benefits of those improved outcomes to create our overall estimate of program benefits. We subtract program costs from these benefits to identify the net benefit of the program. We also calculate ROI as the total benefits divided by the total costs for an estimate of the return on each dollar invested in the program.

### Subsequent births

We used Tandem (PCC) data to estimate the percent of Tandem participants who had a subsequent birth within two years of the birth of their first child. As revealed in the cost effectiveness analysis, the rate of subsequent births for Tandem participants is 11%. Given that Tandem averaged approximately 44 new patients per year in the last three years, we use 44 as a typical cohort of Tandem participants who could be tracked for their short and long term outcomes. We use 44 rather than the 99 in this particular analysis because it avoids the problem of duplication (the 99 core participants include both new and existing participants). For the cost-benefit analysis it is important to create a cohort of unduplicated patients for our analysis so as not to count a given outcome twice (e.g. lack of a subsequent birth). Using these figures we estimate that each year Tandem serves approximately 4.84 participants who will eventually have a subsequent birth ( $44 \times .11$ ). An examination of the literature reveals that approximately 24% of teen mothers will have a subsequent birth within two years.<sup>19</sup> Thus, if our cohort of 44 new Tandem participants had not received the program we might expect that approximately 24% of them would have had a subsequent birth, or 10.56 subsequent births. We determine the net benefit of the program to be  $10.56 - 4.84$  or 5.72 fewer subsequent births than might have been expected.

Available literature provides information on the consequences of subsequent births for teenagers. Subsequent children born to teen mothers actually have worse outcomes than first children and further reduce the life chances of the mothers. These consequences and their estimated costs are provided below. All estimates obtained from the literature have been adjusted for inflation to reflect 2007 dollars:

- The 5.72 additional children born to teen mothers will incur the expenses typically associated with children born to teen mothers. These children are likely to have worse health, lower earnings as adults, and a greater risk of incarceration than children born to older mothers.<sup>20</sup>

- Additional healthcare expenses have been estimated at \$145 per year per child.
- Children born to teen mothers earn \$35,000 less over their lifetimes.
- Sons of teen mothers are more likely to be incarcerated with an average cost of \$40,000 per year for incarceration.

- Closely spaced births ( $\leq 15$  month interval) are more likely to be preterm deliveries. Thus, subsequent births within two years have higher rates of prematurity (12%).<sup>21</sup>

- The average cost of a preterm infant is \$84,310

- \*A subsequent birth for a teen mother dramatically reduces the odds that she will complete high school (a 70% reduction in the odds of completing high school compared to teen mothers with one child).<sup>22</sup> This results in a graduation rate of 15% relative to the 50% documented for teen mothers with one child.

- The lifetime benefit of a high school diploma has been estimated to be \$224,660, an estimate (adjusted for inflation) obtained from the Center for Cost-Benefit Studies of Education at Teachers' College, Columbia University.<sup>23</sup> Their estimate of the gross value of a high school education includes, the average lifetime benefit of additional taxes paid per expected high school graduate, the average lifetime public health savings per expected high school graduate achieved through reduction in Medicare and Medicaid costs, and the average lifetime crime related cost reduction per expected graduate.

- \*Subsequent births/children are twice as likely to be abused and neglected than the first children born to teen mothers and they spend an average of 255 more days in foster care than first children born to teen mothers.<sup>24</sup>

- The average cost of foster care per day is \$109.<sup>25</sup>

These negative outcomes and their associated costs are outlined in the table that follows. Based upon the estimate provided earlier that the Tandem program represents a reduction of 5.72 subsequent births, the table provides the calculations of the monetary benefits that might accrue because of 5.72 fewer subsequent births to teens.

**Table II: Benefits of Tandem Program in Reduced Subsequent Births**

<i>Subsequent Births: Associated Outcome</i>	<i>Tandem Improvement</i>	<i>Cost per outcome</i>	<i>Total Cost Savings</i>
↑ Premature delivery for closely spaced birth	5.72(risk of prematurity)= 5.72(.12)=.69 more preterm infants	\$84,310/preterm infant	\$57,870
↑ Health problems	5.72 fewer births	(\$145)(18yrs) =\$2,610/health care costs	\$14,929
↑ Rate of child abuse/neglect for second child	(5.72)(.38)(255)=554 less days a child is in foster care	\$109/day in foster care	\$60,386
↓ Earnings for children	5.72	\$35,000/lost earnings	\$200,200
↑ Incarceration for sons (as juveniles)	5.72(sons)(risk of incarceration)(time incarcerated)= 5.72(.50)(.14)(.57) = .23 less time incarcerated	\$40,000/yr for incarceration	\$9,129
↑ High school dropout for mothers with subsequent birth	5.72(.15)-5.72(.50) =2.002 more HS graduates	\$224,660/graduate	\$449,769
<b>Subtotal: Benefits of reduced subsequent births</b>			<b>\$792,283</b>

### Child abuse/neglect

The second outcome measure used in the cost-benefit analysis is child abuse and neglect. With the assistance of a Lifeworks research assistant we reviewed Tandem case files and asked caseworkers to provide information on reported cases of abuse/neglect for Tandem participants. We then calculated abuse/neglect report rates for those teens for which at least two years follow-up (after the birth) was available (n=113). These data reveal that 4.4% of Tandem participants had a report of abuse and/or neglect. We compared this to the national estimates of abuse/neglect for teen mothers, which is 19%.<sup>26</sup> We estimate the reduction in cases of abuse/neglect associated with the Tandem program as follows:

Reduction in cases of abuse/neglect= (# Tandem teens in annual cohort)(rate of reported abuse/neglect for Tandem participants) – (# Tandem teens in annual cohort)(rate of reported abuse/neglect for teen parents not receiving specialized services)

**Reduction in cases of abuse/neglect = (44)(.044) – (44)(.19) = 6.42**

This analysis suggests that the Tandem program is associated with 6.42 less cases of reported abuse/neglect than could be expected for a comparable group of teen mothers without specialized services. Table III below provides estimates of the cost savings/benefits associated with this reduction of 6.42 reported cases of maltreatment.<sup>27</sup>

**Table III: Benefits of Tandem Program in Reduced Child Abuse/Neglect**

<i>Child Abuse/Neglect: Associated Outcome</i>	<i>Tandem Reduction</i>	<i>Cost per Outcome</i>	<i>Total cost savings</i>
CPS investigation	6.42 fewer cases	\$1,188	\$7,627
CPS services (counseling)	6.42 fewer cases	3,947	\$25,340
Foster care	6.42(% that go to foster care)(avg. mths in foster care)=(6.42(.18)(16)=18.49 fewer months in foster care	3,316 per mth in foster care	\$61,302
<b>Subtotal: CPS cost savings/benefits</b>			<b>\$86,650</b>

As mentioned, there is much room for error in calculating costs relative to benefits. This is nowhere more evident than in the analysis of child abuse and neglect. First, underreporting is always a serious concern with child abuse and neglect. Thus we may have underestimated the rate of abuse/neglect for Tandem participants. Alternately, Tandem participants who abuse/neglect their children might be more likely to be detected than teen mothers who do not have regular contact with health care and social work professional well versed in indicators of abuse and neglect. Thus, the Tandem rates may be even more accurate than the rates reported by the literature for the comparison group of teen mothers without specialized services (which may be underestimated). The extent of this potential measurement error cannot be determined. However, most child abuse/neglect researchers acknowledge that while imperfect, empirical investigations of child abuse and neglect simply must be attempted. Another limitation of the cost-benefit analysis of child maltreatment is our inability to place a monetary value on protecting a child from abuse or neglect. Our estimates of the value of reducing child abuse and neglect are unmistakably underestimating the benefits of reducing child maltreatment. For example, research reveals that the second/subsequent child of a teen mother is more

than ten times more likely to be the victim of an infant homicide compared to the first child born to a teen mother.<sup>28</sup> We have not included this in our cost-benefit analysis because we cannot estimate the value of the life of a child. While this finding is not part of our calculations, it may be the most persuasive argument of all for supporting a program, such as Tandem, that is able to significantly reduce both the rate of subsequent pregnancies and abuse/neglect for teen mothers.

Summary of Cost-Benefit Analysis

To calculate costs relative to benefits we total the cost savings/benefits from the two outcomes and subtract this subtotal from the total Tandem costs. The return on investment is calculated as benefits/costs. The results of the cost-benefit analysis are summarized in the table below:

**Table IV: Summary Cost-Benefit Analysis**

<i>Outcome</i>	<i>Tandem Rate</i>	<i>Baseline Rate: US Teen Parents</i>	<i>Tandem Program Effect</i>	<i>Benefit</i>	<i>Cumulative Benefits</i>
Subsequent birth rate	11%	24%	14.5% reduction for 5.72 fewer births	\$792,283	\$792,283
Reported rate of abuse/neglect	4.5%	19%	14.6% reduction for 6.42 fewer cases of abuse/neglect	\$86,650	\$878,933
Total benefits - program costs <b>Net benefit</b>					\$878,933 -\$375,821 <b>\$503,112</b>
<b>ROI (benefits/costs)</b>					<b>2.34</b>

Results reveal that Tandem produces a net benefit of \$503,112. This represents a return on investment (ROI) of \$2.34. Thus \$2.34 of benefits accrue for every dollar spent on the Tandem program.

Washington State Institute for Public Policy conducted a meta-analysis of cost-benefit studies of social programs for youth.<sup>29</sup> They provided the ROI for these programs. Their

ROI figures are not necessarily comparable to ours because many of these programs are not teen parenting programs specifically (e.g. pregnancy prevention). In addition, analyses of programs that more closely resemble Tandem assessed outcomes different than those of the present study. For example, they offer a ROI figure for the NFP program but they do not estimate the outcome of reduced subsequent pregnancies, which we do. Thus, they are likely underestimating the true benefit of the NFP program. However, they do assess the value of cognitive/behavioral improvements in the children of teen mothers served by the NFP program, which we do not assess. In that respect, we likely underestimate the value of Tandem. Thus we feel the ROI figures from their study must be viewed very generally, as an estimate, rather than the undisputed true return. Despite these caveats, we feel that this study provides interesting information. We offer a sample of the ROI ratios from this study below and how they compare to the ROI found this study for Tandem.

**Table V: ROI for Tandem Relative to Washington State Institute for Public Policy Meta-Analysis of Programs for Youth**

<b>Child Welfare Programs/Teen Pregnancy Prevention Programs</b>	<b>Benefit per Dollar Cost (ROI)</b>
<b>Tandem</b>	<b>\$2.34</b>
Nurse Family Partnership	\$2.88
Home Visiting Programs for At-risk Mothers and Children	\$2.24
Parent-Child Interaction Therapy	\$3.64
Healthy Families America	\$0.62
Systems of Care/Wraparound Programs	\$0.00
Family Preservation Services	\$0.00
Comprehensive Child Development Program	\$0.00
The Infant Health and Development Program	\$0.00
Teen Outreach Program	\$1.29
Reducing the Risk Program	\$0.00
Postponing Sexual Involvement Program	-\$5.07
Teen Talk	\$0.00
School-Based Clinics for Pregnancy Prevention	\$0.00
Adolescent Sibling Pregnancy Prevention Project	\$0.21
Children’s Aid Society-Carrera Project	\$0.21

The broad conclusion of the Washington study, as revealed in the table above, is that the majority of the existing programs for children/teens do not provide an acceptable return on investment. A few programs, such as the NFP, were profiled as the exceptions, those programs able to produce a strong return on investment. As we can see from the chart, our estimates of the return on investment for Tandem are similar to the small group of programs that are able to turn a profit. Thus, the Tandem program has distinguished itself as one of the few programs that offer a net financial benefit in addition to the social and personal benefits that accrue to Tandem participants.

## Summary and Conclusions

Teen pregnancy and parenting is a pressing concern in the United States. Despite significant declines in the last decade, the United States still has the highest teen pregnancy and birth rates in the industrialized world. Teen childbearing is problematic because of its associated adverse consequences. Children born to teen mothers have more health problems, lower levels of cognitive functioning, are more likely to be abused or neglected, have lower levels of educational attainment, more welfare dependence, and a greater likelihood of incarceration as adults than are children born to non-teen mothers. In addition, teen mothers are less likely to finish high school and more likely to use welfare than are non-teen mothers. Thus, there are important personal consequences for teen mothers and their children. In addition, these poor outcomes represent a significant cost to taxpayers.

St. David's Community Health Foundation currently provides funding for the Tandem Teen Prenatal and Parenting Program. The Tandem Program is a home/school visitation program designed to provide medical, mental health, educational/vocational services and social support to program participants. The program aims to improve the health and well-being of teen mothers and their children and to reduce the incidence of additional pregnancies for these young women. The program is an interagency collaboration with services provided by People's Community Clinic (lead agency), Any Baby Can, Child and Family Resource Center, Lifeworks, and Austin Child Guidance Center.

Dr. Carol Lewis, the Associate Director of The Center for Social Work Research at the University of Texas, is conducting a comprehensive five-year evaluation of the Tandem program. That evaluation is currently in its third year. This evaluation will provide information on program implementation, program strengths and weaknesses, and assessments of a wide array of physical, psychological, and social outcomes for participating teens and their children. This evaluation will be critically important for determining program effectiveness. The present study provides a cost analysis of the Tandem program to supplement the existing evaluation.

Prevention and early intervention programs are often evaluated in terms of their absolute effectiveness (ability to improve outcomes). However, funding agencies are often not assessing whether or not to provide funding to programs that improve outcomes for teens, but *which* program represents the most effective and efficient approach to serving teen parents and their children. Efficient programs produce improvements in outcomes for a relatively low cost compared to available alternatives. Further, funding agencies want to know if program funding represents a wise investment, that the program will be able to produce benefits that at least meet, or ideally, exceed program costs. Funding agencies, taxpayers, and program participants deserve programs that make the most of available resources. Programs that are efficient and which provide a strong return on investment are those that will be able to offer maximum benefits to the largest number of participants. Thus, we provide a cost analysis of the Tandem program that assesses a) Tandem costs compared to costs of other teen parenting programs, b) cost effectiveness

(costs/outcomes) for Tandem relative to a competing program (Nurse Family Partnership), and c) Tandem costs relative to benefits (return on investment).

The results of the cost comparison reveal that Tandem is a moderately priced program with an average cost per participant of \$1,900. This is slightly higher than available social service models for teen parents. For example, Project Reach from the Ft. Worth Independent School District costs \$1,644 and Project MELD of the Methodist Healthcare Ministries in South Texas has a cost of \$1,340 per participant. The Tandem program cost is higher, in part, because it is a medical, rather than a social service model of care. When compared to the cost of another medical model, the Nurse Family Partnership (NFP), we see that Tandem program costs are less than half the cost of the Nurse Family Partnership program (\$4,500). The NFP is the prevailing medical model of care for young low-income mothers. Thus Tandem appears to be a reasonably priced program from among the available options for serving young mothers and their children.

The results also reveal that Tandem is a cost effective program. Cost effectiveness is the cost per successful outcome. A lower cost per success suggests that a program is an efficient use of funds. We divide the total cost of Tandem by the number of successful outcomes (number of teens avoiding a subsequent birth) for a cost effectiveness estimate of \$4,265. This figure is less than the cost per successful outcome for the Nurse Family Partnership program (\$5,114-5,769). The NFP program represents the gold standard for effective parenting programs for young low-income mothers. Tandem's cost effectiveness stems from both its relatively low overall cost and its high rate of success in reducing subsequent births to teens. Approximately 11% of teens participating in the Tandem program experienced a subsequent birth in the two-year follow-up period. The subsequent birth rate estimated for NFP participants ranges from 12-22%.

Finally we assessed Tandem using a cost-benefit analysis. Cost-Benefit analyses examine the financial benefits of the program that accrue (short-term and long-term) and compare them to the program costs. The intent is to see if a program is justified by producing benefits that at least meet program costs. Ideally a program would be able to offer a "net profit" providing benefits that exceed costs. We estimate benefits based on two outcome measures, rate of subsequent births and reported rates of child abuse/neglect. We obtain estimates of Tandem participants' outcomes on these measures and compare that to what might be expected from the teen parenting population that does not receive specialized services to estimate the net benefit associated with the Tandem program. We then estimate the financial benefit of these improved outcomes.

The Tandem program outcomes are better than those expected for the teen parent population not receiving services. Approximately 11% of Tandem teens experienced a subsequent birth in two years whereas the national average for teen parents is 24%. In addition, approximately 4.4% of Tandem parents had a reported case of child maltreatment in the two year follow-up period whereas the national estimate for low-income teen parents during this time frame is 19%. We estimate that these improvements result in approximately 6 fewer subsequent births and 6 fewer cases of child abuse/neglect per year for Tandem participants. There are significant financial benefits of

these improved outcomes. Specifically, subsequent births (within two years) incur expenses because these children are more likely to be preterm and have more health problems. In addition teens that have a subsequent birth are 70% less likely to finish high school than teens with only one child. Failure to complete high school leads to significant reductions in earning power, taxes paid, higher Medicaid payments, and more criminal activity. Higher rates of child abuse/neglect create numerous costs in terms of CPS investigation, services, and foster care expenses. This report estimates these costs and compares them to the costs of the program. The result reveals that the Tandem program produces a net profit of approximately \$503,112, or a return on investment of \$2.34.

The cost-benefit analysis likely underestimates program benefits. Not all program outcomes have been analyzed. For example, we originally hoped to analyze educational outcomes for Tandem youth. However, Tandem youth are so young that high school graduation rates are not yet available. In addition, the most important limitation of the present study is that many social and psychological benefits cannot be monetized and thus are not represented in this analysis. For example, second children born to teen mothers are 10 times more likely to die from infant homicide than are first born children. By reducing the rate of subsequent births, Tandem reduces the chance of this outcome, yet this benefit cannot be assigned a dollar value.

This cost analysis has other limitations to consider. The most important is that the Tandem outcomes are compared to outcomes for other programs (NFP) and outcomes recorded for the general teen parent population not receiving specialized services. These comparisons have methodological limitations in that we do not know if the Tandem participants are comparable to those of the comparison populations. The only way to conclusively prove that Tandem was able to significantly improve outcomes for their participants would be to have a randomly assigned control group of pregnant teens coming to People's Community Clinic who did not receive Tandem services. However, pragmatically, financially, and ethically, this type of randomized control is difficult to achieve and not available for the present study. Thus, caution should be used in interpreting the program "effects" as they are estimated program benefits. However, we feel that the comparisons to the literature, while not ideal, are sound. The Tandem program serves a teen parenting population that shares all the same disadvantages of the comparison groups in terms of income, access to health care and other socio-economic disadvantages. In addition, the Tandem participant population actually profiles as younger and more likely to be Hispanic than the general teen parent population, two characteristics that are usually associated with worse outcomes (higher rates of subsequent births). Thus, the fact that Tandem outcomes are better than those for the comparison population is quite striking and noteworthy.

While the current study does have limitations, the findings are compelling. On all three dimensions, cost comparison, cost effectiveness, and cost-benefit, the Tandem program exhibits a strong performance. It is a program that produces substantially lower rates of subsequent births and lower rates of abuse/neglect, at a relatively low cost. The Washington State Institute for Public Policy recently published a meta-analysis of the

return on investment of early intervention/prevention programs for youth (2004).<sup>30</sup> The results reveal that the vast majority of existing programs for youth are not financially justified, producing a net loss with costs exceeding benefits. They did find some programs to offer a good return on investment. One of the most “profitable” programs was the Nurse Family Partnership, which produced a net return of \$2.88 for every dollar invested. This has led many to endorse the NFP and some to suggest that the NFP program should be a government sponsored national program. Our analysis reveals that the Tandem program also is a profitable program with a ROI of \$2.34. Thus we feel that Tandem is a supremely effective and efficient program. It has distinguished itself from among the numerous unprofitable programs in existence and profiled among the ranks of the top performing programs in the country. Tandem is clearly a wise investment, making a contribution to teen mothers, their children, and the community at large.

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