**Diabetes and the Labor Market**

The community-wide economic cost in the Lower Rio Grande Valley

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Economic analyses of diabetes and diabetes treatment and prevention are increasingly common (1–11). The cost of illness studies divide costs into direct and indirect components (12,13). Indirect costs are typically those associated with limited employment-related productivity (14–18). Direct costs usually include hospital and other medical costs (19–25). While these approaches have merit at the national level, they are less applicable at the community level for two reasons. First, lost income due to diabetes translates into substantially reduced local spending for everyone in communities where the prevalence of diabetes is high. For example, in a community with high diabetes-related unemployment, income reductions related to diabetes translate into less local spending, leading to layoffs and reduced expenditures. Second, the economy of the local community partially benefits from medical expenditures, which are largely inflows from outside the community but spent locally. In this study, we use an alternative method to assess the local economic impact of diabetes: input-output analysis. We focus on a largely Mexican-American community with a 25% type 2 diabetes prevalence rate, the Lower Rio Grande Valley (LRGV) of South Texas (26). We intend to show that the standard practice of including local medical care costs is not necessary to highlight the high cost of diabetes. Further, we will demonstrate that labor productivity losses associated with diabetes adversely affect income prospects of the wider community.

**RESEARCH DESIGN AND METHODS** — There have been several diabetes and labor productivity studies in economics literature (14–18). Two of these were conducted in the LRGV, partly due to the area’s high diabetes prevalence (14,18). These studies used data from the Border Epidemiologic Study on Aging (BESA), a population-based survey of Mexican Americans aged ≥45 years residing in the LRGV. BESA includes extensive socioeconomic, demographic, and health information on a sample of 1,089 respondents. First, we use wage equations from Bastida and Pagán (14). After controlling for human capital and other confounders such as acculturation, Bastida and Pagán show that women with diabetes earn $3,584.53 less than women without diabetes, whereas men with diabetes earn $1,584.66 less than men without diabetes. Second, we use wage propensity equations from Brown et al. (18). In their first model, Brown et al. show that males and females with diabetes were ~7.5 percentage points less likely to work than males and females without diabetes. In their second model, men with diabetes were 10.5 percentage points less likely to work than men without diabetes, whereas there were no diabetes-related differences for women (18).

Regional input-output models are based on the standard model used in macroeconomic analysis intended for national accounts. More detailed explanations of input-output analysis exist elsewhere (27). Input-output analysis allows for an examination of the economic relationships between consumer expenditures and businesses within a given area. It captures the flow of dollars from purchasers to producers using interindustry transaction information. Individual industry production functions, or mathematical equations modeling the conversion of inputs from various sectors to outputs in other sectors, describe how many resources are used in each industry and how each industry relates to other industries.

There are three types of effects that are estimated with input-output models: direct, indirect, and induced. In our case, direct effects are the loss of income due to diabetes. Indirect effects are the resulting changes in interindustry purchases. Finally, induced effects are changes in interindustry purchases resulting from households spending their income generated from direct and indirect effects.

This study uses an input-output model for the four counties that comprise the LRGV (Cameron, Hidalgo, Starr, and Willacy) (28). The LRGV has a per capita income ranging from $7,069 in Starr County to $10,960 in Hidalgo County and a population of 978,369 (29).

We estimate income loss due to diabetes as follows. First, we estimate the number of people with diabetes by multiplying the number of Latinos (almost all are Mexican American) in the LRGV >45 years of age (29) by the sex-specific diabetes prevalence for Mexican Americans >45 years of age (26). Then, we estimate the number of unemployed adults with diabetes, by sex, from BESA. Finally, we aggregate the wage differential for employed adults with diabetes, by sex (14,18).

**RESULTS** — The results are shown in Table 1. The first column shows estimates of labor costs based on the working propensity equation, model 1, estimated in Brown et al. (18). The second column shows estimates of labor costs based on the working propensity equation, model 2, estimated in Brown et al. (18). In model 2, a technique known in econometrics as instrumental variables is used. The third column includes the wage equation, model 3, from Bastida and Pagán (14). Finally, the fourth column combines the
estimates for models 1 and 3, yielding results for lost productivity for the employed and unemployed combined. In all three cases, the output multiplier is 1.36. Thus, the local economy contracts by $0.36 for every dollar reduction in labor income resulting from diabetes.

**CONCLUSIONS** — The results show that the indirect costs of diabetes extend beyond the costs to those with diabetes alone. In the LRGV, for every dollar of labor income lost by adults with diabetes, a further income reduction of $0.36 occurs in the community. This is because adults with diabetes who are not working spend less, hurting the local economy. In a small community with a high prevalence of diabetes, the indirect costs of diabetes are quite high and are not limited to adults with diabetes alone. Given these results, policies to prevent diabetes should be especially supported in communities with a high prevalence of diabetes precisely because of its broad economic impact on the entire community.

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**References**

1. Mason JM, Freemantle N, Gibson JM, New JP, the SPLINT Trial: Specialist nurse-led clinics to improve control of hypertension and hyperlipidemia in diabetics: economic analysis of the SPLINT trial. Diabetes Care 28:40–46, 2005


23. Weinstock RS, Hawley G, Repke D, Feuerstein BL, Sawin CT, Pogach LM: Pharmacy costs and glycemic control in the Department of Veterans Affairs. Diabetes Care 27 (Suppl. 2):B74–B81, 2004

24. Maciejewski ML, Maynard C: Diabetes-related utilization and costs for inpatient and outpatient services in the Veterans Administration. Diabetes Care 27 (Suppl. 2):B69–B73, 2004


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**Table 1—Dollar output reductions related to employment and productivity losses associated with diabetes**

<table>
<thead>
<tr>
<th>Source of Output Reduction</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 1 and 3</th>
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<tr>
<td>Direct income reduction</td>
<td>$99,867,375</td>
<td>$83,129,063</td>
<td>$66,622,278</td>
<td>$166,489,653</td>
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<tr>
<td>Indirect and induced output reduction</td>
<td>$36,600,666</td>
<td>$30,466,197</td>
<td>$24,416,579</td>
<td>$61,017,245</td>
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<tr>
<td>Total output reduction</td>
<td>$136,468,041</td>
<td>$113,595,260</td>
<td>$91,038,857</td>
<td>$227,506,898</td>
</tr>
</tbody>
</table>

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**Economic costs of diabetes**