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Fibre connectivity and economic participation in a South African township

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This study has been approved by Stellenbosch University Research Ethics Committee: Social, Behavioural and Educational Research (REC: SBE) (Ref. No: 33911).

Executive Summary

This is the second in a series of BER Research Notes that studies the effect of bringing affordable and fast broadband to South African townships.

The first note[1] provided a detailed overview of home fibre, our methodology and causal estimation. It focused on whether home fibre affected online behaviour in Kayamandi, a township in Stellenbosch, and found that home fibre was associated with lower overall connectivity costs and a higher likelihood of using the internet for online learning and for job search - the latter particularly among individuals already engaged in some form of paid work.

This note investigates whether the increased likelihood of using the internet for job search affected employment outcomes. If you would like a deeper understanding of our identification strategy (which is the same as we use here), we strongly recommend reading the methodological sections of the earlier note. Both draw from household survey data collected between 2022 and 2025 in Kayamandi and use the staggered rollout of a fibre network by fibertime™ to study treatment effects. By installing a router in every home it passes, fibertime's network offers a rare opportunity to consider home fibre as exogenous - a necessary condition to assign causality.

We show here that home fibre in Kayamandi had a meaningful impact on economic participation. Specifically, it helped workers transition into more stable jobs. In addition, among dwellings that have had fibre for the longest, home fibre was associated with a more than twofold increase in the probability that someone was self-employed.[2] Residents leveraged fast and affordable internet to find better or alternative work, and start or expand micro-enterprises, whether selling goods, offering services, or pursuing other entrepreneurial endeavours. By lowering the cost of entry to digital tools and platforms, home fibre supported and helped to facilitate upward economic mobility and entrepreneurship in Kayamandi.

[1] Fourie, H. & D. Shepherd (2025). The impact of fibre broadband on online behaviour in a South African township, BER Research Note, 20 November

[2] Self-employment in this context means that someone is the owner of a business and/or working in his/her own business.

Contents

Introduction

Despite a growing body of literature linking internet access to economic opportunity and productivity, causal evidence about how high-speed connectivity affects employment outcomes in developing countries remains limited. Broadband rollout is seldom random and typically follows commercial viability and demand, which makes it difficult to establish a causal relationship.

We exploit a rare, quasi-experimental opportunity to study the introduction of fibre broadband in Kayamandi, a South African township in the Western Cape. Using household-level survey data linked to the spatial rollout sequence, we apply a staggered difference-in-differences approach to isolate the impact of home fibre. Essentially, this econometric approach allows us to compare outcomes for respondents living in dwellings *with* home fibre to those *without* home fibre.

The direction of the observed effects is clear: among respondents living in homes with fibre, we find an increase in stable (full-time, formal sector) employment for those who already did some form of paid work, even if it was just casual work. We also find consistent increases in people who report themselves as business owners ('self-employed').

It is not a novel idea that affordable and fast internet access affects economic participation and there are several mechanisms whereby these changes might occur. Reliable, low-cost broadband lowers search and information costs (registering on job portals, submitting online applications, etc.), which can support transitions into the types of jobs typically advertised online.

In terms of entrepreneurship, high-speed connectivity can reduce coordination and transaction costs (payments, customer communication, communicating with suppliers). Fibre access can also expand feasible work arrangements, making it easier for people to work or run a business from home.

Peer-reviewed research about the impact of the internet on labour outcomes has found evidence of a positive correlation between fixed or mobile

broadband penetration and job creation in emerging markets. One study found that a 10% increase in broadband penetration in Latin America and the Caribbean would result in around 67 000 new jobs being created (Zaballos and López-Rivas, 2012). Katz (2009) estimates that Latin America had a broadband penetration gap of 11 000 lines in 2009, and that bridging this gap could create 378 000 jobs.

Bahia et al. (2024) investigate the correlation between mobile broadband and employment outcomes in Nigeria. They find evidence of greater labour force participation and employment, mostly among women, and of increased consumption. The improved labour force participation outcomes were most prevalent for individuals from poor households. Bahia et al. (2021) identifies similar trends in Tanzania, where internet access increased non-farm wage employment. Moreover, a study set in Senegal shows that improvements in welfare were partly attributed to increased formal employment that resulted from 3G mobile network coverage (Masaki et al., 2020).

These studies highlight that expanding digital connectivity matters for higher employment, greater labour force participation, and improved welfare, particularly among lower-income groups previously excluded from the digital economy. Our case builds on this in a South African context.

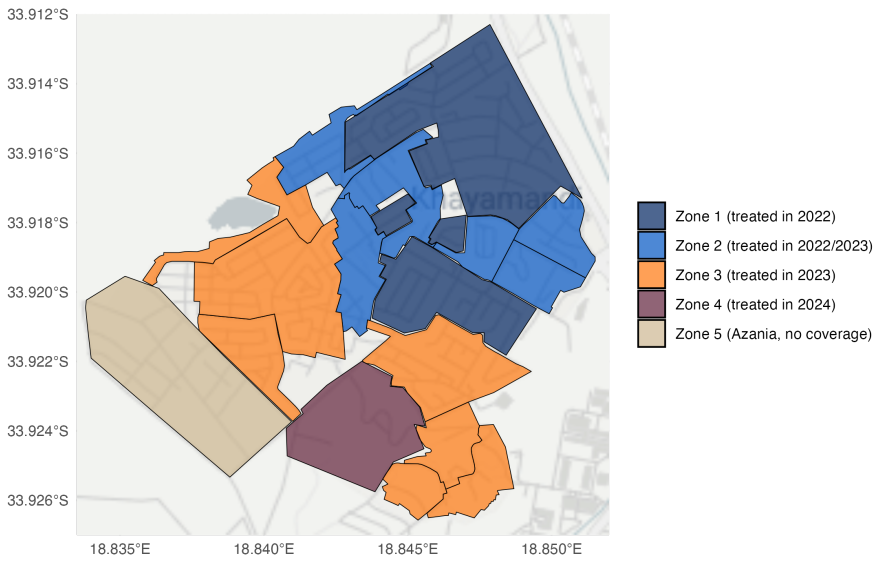
Methodology

DATA COLLECTION

We use fibertime's staggered fibre rollout in Kayamandi as a natural experiment to examine how affordable and fast internet access affected economic participation. fibertime installs a Wi-Fi router in every home it passes, subject to a permanent electricity connection. It uses an aerial passive optical network (PON) with a single-SSID, where each fibre line serves multiple homes through drop cables from a pole into a home. This design lowers installation costs and allows anyone within range of a router to connect to the fibertime network, even without a router inside their home.

fibertime rolled out its network in Kayamandi in phases between late 2022 and mid-2025. The first homes were activated in October 2022, and large-scale rollout began in mid-2023. By June 2025, approximately 10 300 homes, including both formal and informal dwellings across Kayamandi, had been connected. Homes or areas without municipal electricity remained unconnected. Residents could not influence when their home received a router, which allows us to treat connection timing as exogenous in our causal analysis. The timing of network rollout across different areas of Kayamandi is shown in Figure 1, with *treated* referring to when homes within an area received a fibertime router.

Figure 1: fibertime network rollout in Kayamandi



Source: fibertime

Three survey waves were conducted to coincide with the rollout. The baseline survey (2022Q3) covered 1 001 households (about 6% of Kayamandi's dwellings) before fibertime's network was installed. Follow-up surveys took place in 2023Q4, by which time roughly 46% of sampled dwellings were connected, and again in 2025Q1, when about 85% had routers installed.

We stratified our sample by dwelling type to collect data from a representative set of formal, informal and backyard dwellings. An adult responsible for internet-purchasing decisions was randomly selected

from each sampled dwelling. Interviews were conducted using structured questionnaires.

Our empirical assessment focuses on 715 dwellings surveyed in 2022, 2023 and 2025. In some instances, despite returning to the same dwelling, enumerators were able to interview the same respondents as before, but in the majority of cases they spoke to a different person living in the same house. This created a repeated cross-section of individuals and ensured consistent assignment of treatment status at the dwelling level, even when individual respondents changed. The interviews in 2022 and 2025 were conducted in person. In 2023, enumerators first attempted to contact respondents interviewed in 2022 telephonically, and then visited their homes in person if the original respondent could not be reached. We explain below how we account for any bias that might be introduced by the survey mode.

Prior to network rollout, less than one percent of respondents reported *mostly using fibre* to access the internet in Kayamandi. By our final survey wave (2025), this had increased to 58%, with many more using fibre in addition to their predominant reliance on mobile data. Almost all fibre-users in Kayamandi stated that fibertime was their service provider.

METHOD AND LIMITATIONS

Our earlier BER Research Note[3] details how treatment was assigned and describes our empirical estimation in more depth. In summary, we estimate causal effects using a staggered difference-in-differences model that exploits fibertime's phased rollout across Kayamandi. Dwellings were connected at different times, creating variation in treatment timing. We used fibertime's activation data to assign an activation date to every home in our sample.

Estimation follows Callaway and Sant'Anna (2021), reporting cohort- and time-specific ATTs and dynamic effects from one wave before to one wave after treatment. **In essence, our estimation allows us to compare changes in outcomes for persons living in dwellings with home fibre, to those not**

[3]Fourie, H. & D. Shepherd (2025). The impact of fibre broadband on online behaviour in a South African township, BER Research Note, 20 November

yet connected. The differences in trends are interpreted as the impact of fibre, assuming that treated and untreated areas would have followed parallel trajectories in the absence of home fibre.

The model is designed as a repeated cross-section to account for the fact that we do not speak to the same individuals in every survey wave. To avoid post-treatment bias, we reweight our sample to reflect Kayamandi's age–gender composition at baseline (2022).

We include pre-treatment controls to improve the precision of our estimates and used a weighted logistic regression model that predicts whether someone is employed based on key demographic and household characteristics, baseline employment status, and research design variables such as whether the interview took place during the workweek. The regression output associated with this estimation is provided in the Annexure.

Our main specification focuses on the 715 dwellings that appear in each wave. We also conduct our estimation for a sub-sample of respondents, who reported doing any form of paid work, to see if outcomes change when persons who are disengaged from the job market are excluded.

As a robustness check to address availability bias introduced by the survey mode (i.e., the greater chance of finding economically inactive persons at home), we test if our results hold when we exclude the telephonic interviews conducted in 2023. We also conduct a falsification test to make sure that broader area-specific trends are not driving the estimated treatment effects. We do this by assigning pseudo-treatment in 2023 to the sampled dwellings in Azania (that in actuality don't have home fibre; see Figure 1) and which primarily use mobile data, keeping all others homes as controls.

Although the staggered design helps reduce bias, unobserved local factors like area-specific economic shifts or other unrelated changes in the community could still influence outcomes and affect our parallel-trends assumption. As with any survey data, self-reported measures of employment could introduce potential recall and response bias. In addition, the staggered nature of the rollout means that treatment was not identical for everyone. Some households have had home fibre for longer or experienced different

connection quality and, as mentioned earlier, respondents without home fibre can also use the network. These factors likely attenuate the estimated treatment effects.

Based on these design features, our results are indicative rather than conclusive and unique to Kayamandi. However, as we show below, the directional impacts are an encouraging sign of the potential effects of fast, affordable broadband in low-income communities. Ongoing comparative work will help assess if similar outcomes emerge in other township settings.

Did fibre connectivity affect economic participation?

DESCRIPTIVE STATISTICS AT BASELINE

At baseline in 2022, before any fibre connections were installed, there were already notable structural and socioeconomic differences between our three treatment cohorts (Table 1). Among the homes sampled in our early-treated cohort (i.e., those who received fibre before being surveyed in 2023), 27% were formal brick-and-mortar homes. This reflects fibertime's initial rollout strategy which prioritised formal structures.

These dwelling-type differences are also reflected in household income: before receiving home fibre, the early-treated cohort had the highest average income (about R 5 100 per month), roughly double that of the control (never-treated) group (R 2 600). Households in the never-treated cohort were, on average, also slightly smaller than those living in homes that would receive fibre.

Table 1: Descriptive statistics of households at baseline (2022), per treatment cohort

variable	Never treated	Early treatment	Late treatment
Formal dwelling	3.8%	27.4%	25.6%
Informal dwelling	84.9%	51.8%	52.8%
Backyard dwelling	11.4%	20.9%	21.6%
Household size	2.57	2.81	2.88
Monthly income (R)	2609.62	5076.96	3610.19

Notes: Post-stratification weights were applied to align the sample with Kayamandi's baseline population-dwelling composition.

Employment and education patterns followed a similar trend (Table 2). Respondents in the early-treated group had the highest levels of formal employment (35%) and educational attainment at baseline, with almost two-thirds reporting having at least a Matric (grade 12) qualification. By contrast, those in the never-treated group showed lower education levels (fewer than half had a Matric qualification).

The share of self-employed respondents was modest across all groups, but highest in the late-treatment cohort. The most striking contrast lies in labour force participation: a third of respondents in the never-treated cohort were not economically active (NEA)[4] at baseline, compared with only 12–15% in the early- and late-treated cohorts.

[4]This measure excludes respondents who are studying.

Table 2: Descriptive statistics of respondents at baseline (2022), per treatment cohort

variable	Never treated	Early treatment	Late treatment
Employed: formal sector	25.3%	34.7%	29.3%
Employed: informal sector	16.4%	23.9%	23.8%
Self-employed	4.8%	4.9%	6.3%
Unemployed	13.9%	19.7%	20.5%
NEA	34.3%	12.2%	14.6%
Studying	5.4%	4.7%	5.5%
Min. matric	42.6%	64.8%	45.9%
Youths (18–35 years)	49.6%	57.3%	54.9%
Adults (36 and older)	50.4%	42.7%	45.1%
Female	43.0%	45.5%	50.8%
Male	57.0%	54.5%	49.2%

Notes: Post-stratification weights were applied to align the sample with Kayamandi's baseline population-dwelling composition.

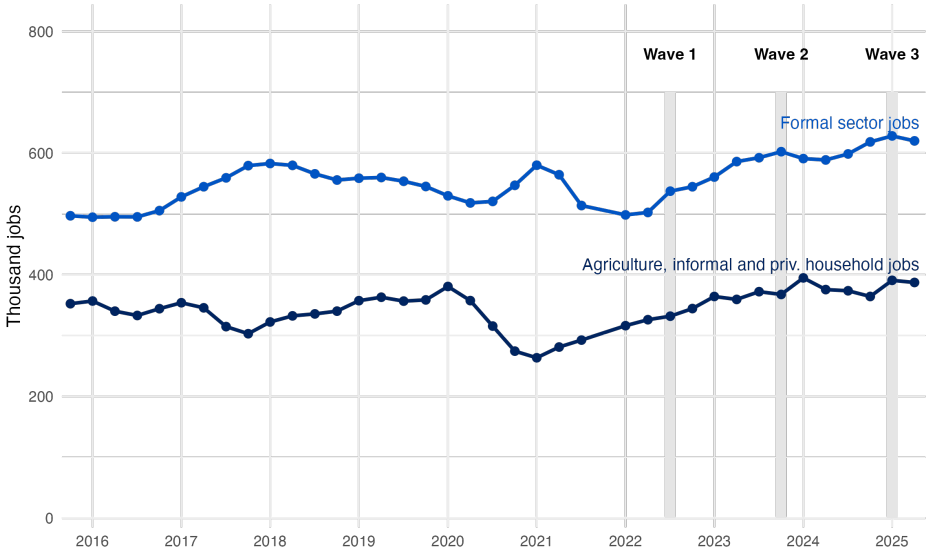
These pre-existing differences highlight the importance of controlling for baseline characteristics and testing for pre-trends to see if cohorts were already on different paths before getting home fibre.

HOW DID KAYAMANDI CHANGE DURING OUR STUDY PERIOD?

Kayamandi underwent notable economic shifts between 2022 and 2025. To understand how home fibre fits into this trajectory, we first distinguish changes driven by broader economic conditions, such as the post-pandemic recovery or local structural dynamics, from those that can plausibly be linked to the fibre rollout.

Stats SA's Quarterly Labour Force Survey (QLFS) shows that, at the time of our 2022 interviews, the labour market was still recovering from the post-pandemic slump (Figure 2). Both formal and other employment in non-metro areas of the Western Cape were higher in 2023 than in 2022, with the general provincial trend continuing upward into 2025.

Figure 2: Employment trends in the Western Cape (non-metro regions)



Notes: The data show the three-quarter moving average to better illustrate general trends. The spike in formal employment between 2020Q3 and 2021Q3 is ascribed to the post-COVID opening of the economy.

Source: Stats SA Quarterly Labour Force Survey, Western Cape (non-metro regions). Author's own calculations.

Table 3 summarises how these broader movements were reflected in Kayamandi. Between 2022 and 2023, unemployment fell sharply and there was a marked rise in part-time formal sector work and informal sector employment. The share of respondents who were economically inactive declined meaningfully over the same period, consistent with the post-pandemic rebound seen in the provincial data.

By 2025, however, Kayamandi's trajectory diverged. The share of economically inactive respondents rose to above 2022 levels and informal employment fell substantially. After the initial rebound in 2023, the local labour market appears to have come under renewed pressure, reflected in a growing share of residents disengaging from the job market.

Table 3: Summary statistics by survey wave

Activity	2022	2023	2025
Employed: formal sector (full-time)	24.9%	21.0%	23.4%
Employed: formal sector (part-time)	6.1%	12.3%	9.2%
Employed: informal	22.5%	51.6%	12.9%
Self-employed	5.4%	4.5%	7.8%
NEA	17.2%	3.5%	26.1%
Unemployed	18.9%	4.0%	11.6%
Mostly uses fibre (self-reported)	1.3%	32.9%	57.5%

Notes: To ensure consistency, the table is limited to interviews conducted in person. Post-stratification weights were applied to align the sample with Kayamandi's baseline population–dwelling composition.

There are several possible explanations for the increase in economic inactivity in Kayamandi in 2025. We suspect that it is related to household membership churn instead of workers leaving the labour force. In 2025, at least 55% of respondents in our sample reported that the person interviewed in 2022 was no longer living at the sampled dwelling. Both push factors (such as local structural conditions or localised crime) and pull factors (such as gaining employment) may have contributed to this turnover. Because our design follows dwellings rather than individuals, we cannot determine which mechanism dominated. Importantly, it introduces a downward rather than an upward bias to our estimated treatment effects. If respondents interviewed in 2022 or 2023 moved for employment and were replaced by someone outside the labour force, our data would record no improvement in economic participation, even if the original respondent's situation had improved.[5]

We also considered whether our research design might introduce upward post-treatment bias. This could occur if home fibre prompted better-off households to move into early-treated areas (Figure 1 Zone 1 and Zone 2)

[5]Respondents reached telephonically in 2023 and who were no longer living at the same dwelling as in 2022 are excluded from our empirical analysis, which focuses on the dwelling as a fixed location. This reduces endogeneity bias, whereby an individual's decision to move could have been affected by the fibre rollout. For the sake of interest, seven respondents sampled in 2023 reported that they had moved out of Kayamandi, each citing work as the reason for their relocation.

or encouraged existing residents to remain because fibre improved their economic opportunities, while less successful households moved away. An assessment of employment and household income patterns suggests the opposite: more successful respondents appear to have moved out. We also cannot rule out behavioural responses, such as fibre making it more attractive to stay at home, or contributing to discouragement after an unsuccessful job search. Our empirical strategy tests whether any of these dynamics can be causally linked to the fibre rollout.

Overall, by following dwellings rather than individuals, our design appears to underestimate the gains associated with home fibre. The estimated treatment effects are further attenuated by the fact that our control group (respondents without home fibre) can still use the fibertime network.

CAUSAL FINDINGS

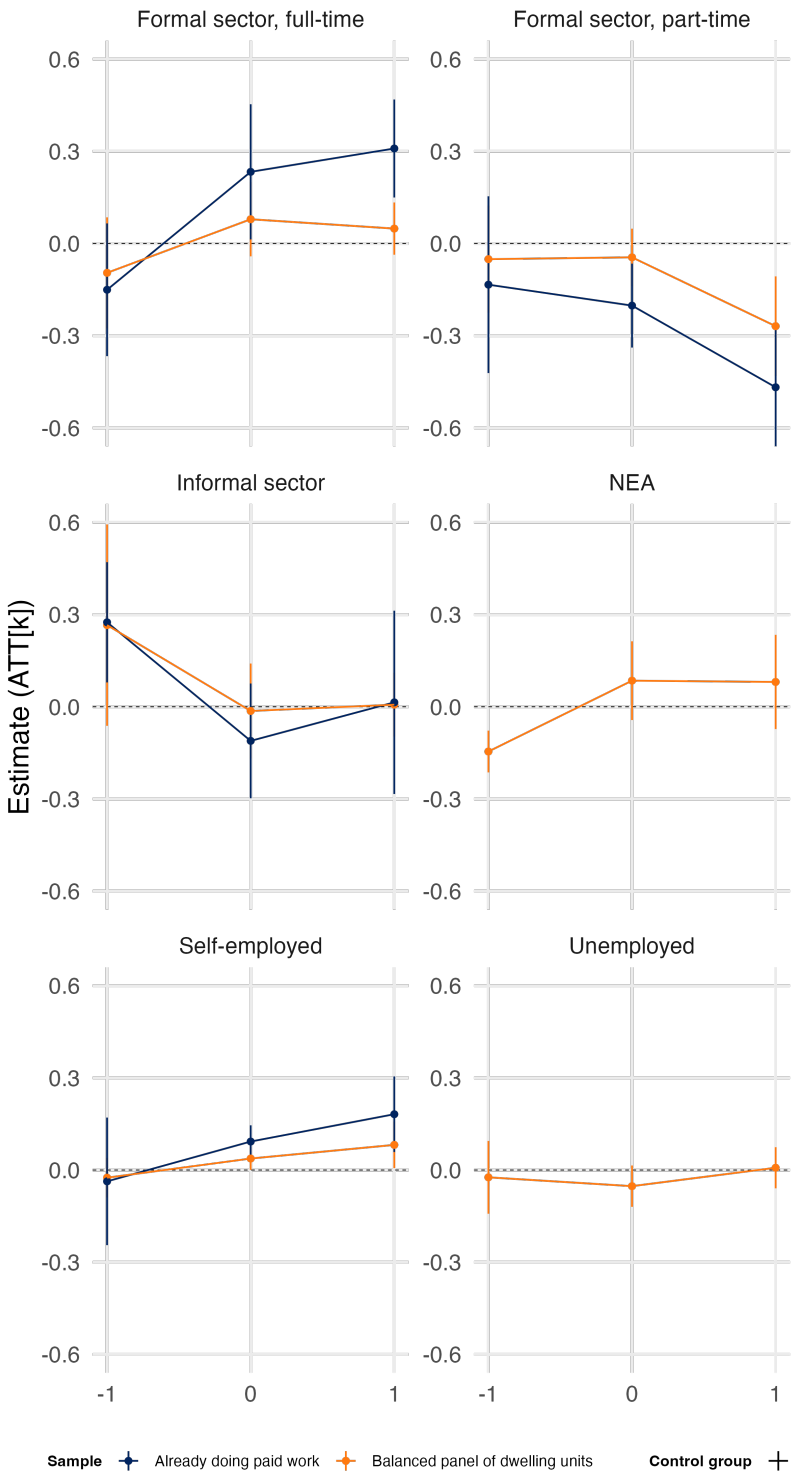
Our main hypothesis is that fibre access could ease some of frictions (like information access, search costs, or coordination problems) that determine whether a person works, looks for work, starts a business, or stays out of the labour force. From our earlier research, we know that persons already attached to paid work (even if just casual) were more likely to use the internet for job search once they received home fibre. Here, we test whether this altered employment outcomes.

The ATT coefficients shown in the event-study plots (Figure 3) are the Average Treatment Effect on the Treated (ATT): the estimated percentage point (p.p.) change in the outcome caused by having home fibre, among those respondents who actually received fibre. The coefficients need to be read in conjunction with Table 2, over which the p.p. change is estimated.

Interpreting the event-study plots

- $t = 0$ marks the first survey period in which a respondent had home fibre (treated); $t = -1$ is the wave before treatment (baseline); $t = +1$ is the wave after treatment. This helps us see not only whether fibre matters, but how effects evolve.
- Marker height shows the direction and size of the effect: the percentage point change in the likelihood that a respondent is employed in a given sector, NEA, or unemployed, compared with what their labour force status would have been without home fibre. A positive value means home fibre increased the likelihood of having a particular labour force status; a negative value means it became less likely.
- Vertical lines show 95% confidence intervals. Longer lines indicate greater uncertainty. Effects are statistically significant and unlikely to be random when the interval does not cross zero.
- If effects appear at $t = 0$, fibre changed outcomes quickly. If effects only appear at $t = +1$, this suggests outcomes took time to adjust.
- When significance appears at $t = 0$ or $t = +1$, we check for pre-trends that could indicate treated and control groups were already diverging before fibre rollout, making it harder to isolate the causal effect. If the effect at $t = -1$ is close to zero, it means treated and untreated households behaved similarly before fibre arrived. This supports the assumption that post-treatment differences reflect the effect of fibre rather than unrelated trends.

Figure 3: Effect of home fibre on economic participation



Notes: Estimates compare respondents with home fibre to those not-yet-treated (NYT). Estimates are weighted to align with Kayamandi's 2022 population composition. Standard errors are clustered at the rollout-zone level (19 clusters).

Home fibre helped workers move into formal sector jobs

Our main specification[6] (orange line in Figure 3) detects a positive coefficient for the effect of home fibre on full-time formal employment, but the estimates are small and imprecise. It implies that for the general Kayamandi population, home fibre did not produce a statistically detectable shift into formal sector full-time employment. It is confirmed by the small and imprecise effect of home fibre on unemployment. Employment in the informal sector reveals a pre-trend and hints that the treated and control groups were already on different informal employment trajectories before receiving home fibre. Our descriptive analyses shown earlier revealed growing disengagement from the job market between 2023 and 2025, and is reflected in the increase in NEA respondents shown below too. This increase, however, also reveals a pre-trend that suggests the trend cannot be causally associated with home fibre.

The effect of home fibre on employment outcomes changes substantially when we restrict the sample to respondents already engaged in paid work (even if it's just casual work). Among workers, home fibre was associated with a substantial increase in the probability that someone is employed full-time in the formal sector (blue line in Figure 3). For the early-treated group, the estimated impact represents an increase of roughly 42% compared to their 2022 employment level. The late-treated group had lower levels of full-time formal sector employment at baseline, and sees a more than doubling in the probability of workers having a more stable job after getting home fibre.

Annexure Table 5 shows that there are no meaningful pre-trends that invalidate these results. We also see a drop in part-time formal sector employment associated with home fibre, highlighting the shift into more stable full-time positions (Figure 3). Our falsification test (Table 5) reveals that there was a general increase in formal sector full-time employment

[6] The dwellings in this sample are limited to the 715 homes that were each interviewed in 2022, 2023 and 2025.

among workers in Kayamandi, but the effects are small by comparison and not immune to treatment spillover.[7]

Our previous Research Note[8], which found that workers (even if just part-time casual) were more likely to use the internet for job search after getting home fibre, suggests that this may be the transmission mechanism whereby home fibre contributed to a movement into more stable work.

The results indicate that home fibre in Kayamandi unlocked opportunities for workers to move into more stable, better or alternative jobs and created a potential for upward mobility. However, home fibre was not enough to push the average person living in a treated dwelling to actively participate in the labour force, especially in the context of a growing disengagement from the labour force, as shown above. The pattern underscores South Africa's deeper employment challenge and the structural barriers, like skill shortages, that keep unemployment persistently high.

Home fibre contributed to business ownership

Beyond the finding that home fibre helped workers transition into more stable jobs, we also find a statistically significant increase in the likelihood that someone with home fibre is self-employed in his or her own business, or owns a business. Among respondents in early-treated homes, home fibre

[7] Annuxure Table 5 also shows that results for a subsample that excludes interviews conducted telephonically in 2023. As mentioned earlier, in 2022 and 2025, interviews were conducted exclusively in person, so respondents in those waves are selected on being available at home during fieldwork. In 2023, however, enumerators first attempted to re-contact baseline respondents telephonically and only visited homes in person when phone contact failed. Because employed individuals were more likely to be reached by phone, the subset of 2023 respondents interviewed in person is negatively selected on employment relative to 2022 and 2025. This two-stage protocol means that our *In person only* robustness sample in 2023 over-represents less-employed individuals. This generates a negative pre-trend that reflects selection on interview mode rather than true pre-treatment dynamics. It is also why observe a smaller coefficient for the early-treated cohort (2) in this subsample.

[8] Fourie, H. & D. Shepherd (2025). The impact of fibre broadband on online behaviour in a South African township, BER Research Note, 20 November

was associated with a more than doubling in the probability that someone was self-employed.[9]

As shown above in Figure 3, the effect of home fibre on self-employment strengthened over time, and there are no statistically significant pre-trends. Annexure Table 6 disaggregates the estimated treatment effect by period and treatment cohort. Given a greater likelihood of finding self-employed persons at home, the treatment effect is larger when we restrict our sample to respondents interviewed in person. The falsification test delivers the opposite sign with a precisely estimated decline in self-employment, underscoring that our results are not driven by generic time trends or survey/sample design.

The direction, stability across subsamples, lack of pre-trends, and the outcome of the falsification test support the interpretation that home fibre in Kayamandi increased the likelihood of self-employment among respondents living in households with home fibre. In contrast to the transition into stable work discussed above, the effect of home fibre on self-employment is observed for the average respondent living in a treated home, and not just for workers.

The share of business owner-respondents in the early-treated cohort who reported using the internet for making payments increased, while it remained flat in the other cohorts. The share of business owner-respondents reporting *not* using the internet for their business because data is too expensive, dropped from ~50% in 2022 to zero in 2025 among those with home fibre.

Ultimately, the most credible and policy-relevant conclusion is directional: fibre access in Kayamandi was associated with a higher likelihood of stable employment among workers, and a higher incidence of self-employment overall.

[9] Our assessment of self-employment excludes respondents with 'side-hustles'; i.e., who are employed in the formal or informal sector but also own a business. This is due to our survey design, where these options were presented as mutually exclusive in our 2022 and 2023 questionnaires. We changed the questionnaire in 2025 to allow people to respond to both options. Eighteen respondents, who in our empirical analysis are captured as in formal/informal employment, reported that they also own a business in 2025.

Conclusion

Our study links fibertime's phased rollout in Kayamandi with detailed household survey data to assess how home fibre affected patterns of economic participation. The staggered difference-in-differences approach allows us to separate the effect of fibre from broader labour-market shifts and pre-existing socioeconomic differences.

Home fibre did not draw large numbers of inactive residents into the labour force or raise overall employment. The rise in economic inactivity between 2023 and 2025 was broad-based and unrelated to fibre access. Within the window of our study, having home fibre also did not alter whether discouraged or low-skilled individuals re-entered the labour market.

Where fibre did matter was for residents who were already working, even if only doing casual jobs. By reducing search and information frictions, home fibre supported transitions into more stable, full-time employment in the formal sector. Fibre access also seems to have reduced some of the costs associated with running a small business, reflected in a higher likelihood of self-employment among connected households.

These productivity-enhancing shifts suggest that affordable, high-speed connectivity can strengthen labour-market attachment and support entrepreneurial activity, even in a challenging local environment. While not a substitute for addressing South Africa's deeper structural barriers to employment, the experience in Kayamandi suggests that home fibre, over time, has the potential to contribute meaningfully to the upward mobility of households in township settings.

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Annexure

Logistic regression model

Our choice of which variables to include as controls in our staggered DiD estimation was informed by a logistics regression model. This helped us identify which observable characteristics were most strongly associated with employment in our sample. Isolating characteristics associated with employment (e.g. demographics, education, dwelling type) allows us to control for potentially confounding factors, thereby improving the precision of our causal estimates.

The results indicate strong persistence in employment: individuals employed at baseline were almost eight times more likely to be employed in the next survey period. Gender, age, and education also predict employment, while dwelling type is not significant. We, however, retain dwelling type to account for zone-specific differences in dwelling composition. Survey mode plays an important role, suggesting that respondents reached via telephone in 2023 were more likely to be employed than those found at home. Similarly, interviews conducted with a person at home during the work week are negatively associated with the probability of employment.

Table 4: Employment Persistence (Logit, Odds Ratios)

	Estimates	
Variable	Odds ratio	95 per cent CI
Employed at baseline	7.96***	[6.36, 9.95]
Male	1.43***	[1.16, 1.76]
Age	1.29***	[1.22, 1.36]
Age^2	1.00***	[1.00, 1.00]
Min. matric certificate	1.77***	[1.43, 2.19]
Household size	0.83***	[0.79, 0.88]
Interviewed in workweek	0.45***	[0.34, 0.58]
Telephonic interview	3.33***	[2.30, 4.84]
Backyard dwelling	1.04	[0.75, 1.43]
Brick-and-mortar dwelling	1.09	[0.83, 1.44]

Notes: Odds ratios with 95% Wald confidence intervals,
Weighted logistic regression (weights = dwelling and age × gender),
Reference categories: Female; Informal dwelling; In-person interview,
$^{*}p < 0.10,\ ^{**}p < 0.05,\ ^{***}p < 0.01$

Table 5: ATT: change in the likelihood of a respondent with home fibre is full-time employed in the formal sector, by time and cohort

Outcome	Sample	Control	Type	Time/Cohort	Estimate	SE	p-value	N
Formal sector, full-time	Dwellings panel	NYT	Cohort effects	2	0.072	(0.045)	0.1138	2 145
Formal sector, full-time	Dwellings panel	NYT	Cohort effects	3	0.059	(0.092)	0.5202	2 145
Formal sector, full-time	Dwellings panel	NYT	Event study	-1	-0.096	(0.106)	0.3668	2 145
Formal sector, full-time	Dwellings panel	NYT	Event study	0	0.079	(0.060)	0.1927	2 145
Formal sector, full-time	Dwellings panel	NYT	Event study	1	0.048	(0.042)	0.2542	2 145
Formal sector, full-time	Worked for pay	NYT	Cohort effects	2	0.202***	(0.069)	0.0033	1 125
Formal sector, full-time	Worked for pay	NYT	Cohort effects	3	0.367**	(0.167)	0.0278	1 125
Formal sector, full-time	Worked for pay	NYT	Event study	-1	-0.151	(0.112)	0.1776	1 125
Formal sector, full-time	Worked for pay	NYT	Event study	0	0.233**	(0.103)	0.0231	1 125
Formal sector, full-time	Worked for pay	NYT	Event study	1	0.309***	(0.087)	0.0004	1 125
Formal sector, full-time	In-person interviews	NYT	Cohort effects	2	0.077*	(0.047)	0.0994	1 859
Formal sector, full-time	In-person interviews	NYT	Cohort effects	3	0.237*	(0.124)	0.0551	1 859
Formal sector, full-time	In-person interviews	NYT	Event study	-1	-0.338***	(0.084)	0.0001	1 859
Formal sector, full-time	In-person interviews	NYT	Event study	0	0.161**	(0.080)	0.0452	1 859
Formal sector, full-time	In-person interviews	NYT	Event study	1	0.057	(0.045)	0.2022	1 859
Formal sector, full-time	Falsification test	NYT	Cohort effects	2	-0.038**	(0.018)	0.0296	2 145
Formal sector, full-time	Falsification test	NYT	Event study	0	-0.085***	(0.031)	0.0056	2 145
Formal sector, full-time	Falsification test	NYT	Event study	1	0.008	(0.017)	0.6408	2 145

Notes: Estimates use person-weights to align the sample with Kayamandi's baseline population, allowing the coefficients to be interpreted as effects for the average adult in the township.
$^{*}p < 0.10,\ ^{**}p < 0.05,\ ^{***}p < 0.01$

Table 6: ATT: change in the likelihood that a respondent with home fibre is self-employed, by time and cohort

Outcome	Sample	Control	Type	Time/Cohort	Estimate	SE	p-value	N
Self-employed	Dwellings panel	NYT	Cohort effects	2	0.049***	(0.019)	0.0080	2 145
Self-employed	Dwellings panel	NYT	Cohort effects	3	0.062	(0.039)	0.1089	2 145
Self-employed	Dwellings panel	NYT	Event study	-1	-0.025	(0.033)	0.4541	2 145
Self-employed	Dwellings panel	NYT	Event study	0	0.037**	(0.018)	0.0342	2 145
Self-employed	Dwellings panel	NYT	Event study	1	0.082**	(0.038)	0.0327	2 145
Self-employed	Worked for pay	NYT	Cohort effects	2	0.105***	(0.031)	0.0007	1 125
Self-employed	Worked for pay	NYT	Cohort effects	3	0.155***	(0.047)	0.0011	1 125
Self-employed	Worked for pay	NYT	Event study	-1	-0.037	(0.108)	0.7318	1 125
Self-employed	Worked for pay	NYT	Event study	0	0.093***	(0.027)	0.0007	1 125
Self-employed	Worked for pay	NYT	Event study	1	0.182***	(0.063)	0.0039	1 125
Self-employed	In-person interviews	NYT	Cohort effects	2	0.061***	(0.018)	0.0010	1 859
Self-employed	In-person interviews	NYT	Cohort effects	3	0.093**	(0.046)	0.0424	1 859
Self-employed	In-person interviews	NYT	Event study	-1	-0.066	(0.068)	0.3274	1 859
Self-employed	In-person interviews	NYT	Event study	0	0.065***	(0.022)	0.0031	1 859
Self-employed	In-person interviews	NYT	Event study	1	0.082**	(0.034)	0.0162	1 859
Self-employed	Falsification test	NYT	Cohort effects	2	-0.065***	(0.009)	0.0000	2 145
Self-employed	Falsification test	NYT	Event study	0	-0.034***	(0.013)	0.0100	2 145
Self-employed	Falsification test	NYT	Event study	1	-0.095***	(0.014)	0.0000	2 145

Notes: Estimates use person-weights to align the sample with Kayamandi's baseline population, allowing the coefficients to be interpreted as effects for the average adult in the township.
$^{*}p < 0.10,\ ^{**}p < 0.05,\ ^{***}p < 0.01$